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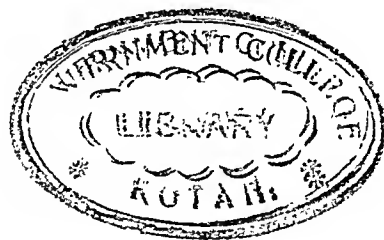
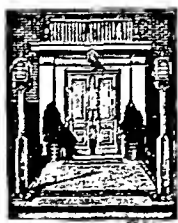
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COMPTON'S PICTURED ENCYCLOPEDIA AND FACT-INDEX

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INQUIRING MIND WITH ACCURATE
INFORMATION TOLD IN AN INTERESTING
STYLE, AND THUS LEAD INTO
BROADER FIELDS OF KNOWLEDGE,
SUCH IS THE PURPOSE OF
THIS WORK



Volume 8

1956 Edition

PUBLISHED BY
F. E. COMPTON & COMPANY + CHICAGO

1956 EDITION
COMPTON'S PICTURED ENCYCLOPEDIA

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Here and There in This Volume

AT ODD TIMES when you are just looking for “something interesting to read,” without any special plan in mind, this list will help you. With this as a guide, you may visit faraway countries, watch people at their work and play, meet famous persons of ancient and modern times, review history’s most brilliant incidents, explore the marvels of nature and science, play games—in short, find whatever suits your fancy of the moment. This list is not intended to serve as a table of contents, an index, or a study-guide. For these purposes consult the Fact-Index and the Reference-Outlines.

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KEY TO PRONUNCIATION

Pronunciations have been indicated in the body of this work only for words which present special difficulties. For the pronunciation of other words, consult the Fact-Index. Marked letters are sounded as in the following words: *cāpe*, *ăt*, *fär*, *fäst*, *whät*, *fəll*; *mě*, *yět*, *fěrn*, *thére*; *īce*, *bīt*; *rōw*, *wōn*, *fōr*, *nōt*, *də*; *cūre*, *būt*, *rude*, *full*, *būrn*; *out*; *ü*=French *u*, German *ü*; *gem*, *gō*; *thin*, *then*; *ñ*=French nasal (*Jean*); *zh*=French *j* (*z* in *azure*); *κ*=German guttural *ch*.

» K «

KAFIR. Grain sorghum called kafir or kafir corn was introduced from South Africa in 1876 and is now grown widely in the southwestern United States for grain and forage. It is particularly valuable in semiarid regions where other grains, like corn, do not thrive. The juicy stem and leaves make excellent silage; the popcorn-sized grain, growing in a bushy head containing hundreds of kernels, is used for stock and poultry feed, and also for human food, being similar to cornmeal. (See Sorghum.)

KALEIDOSCOPE. This scientific toy, which presents an ever-changing series of bright colorful patterns, was invented by Sir David Brewster in 1817. In its simplest form it is a twelve-by-three-inch tube. Through it extend three joined mirrors, making a hollow triangle. At one end there is a compartment that contains bits of glass of many sizes and shapes. The outer end of this compartment is clouded glass; the inner end, clear glass. At the other end of the tube is the eye glass. When the tube is turned the colored bits fall into different positions and these, reflected in the mirrors, make the enchanting designs.

KAMCHATKA (*kām-chăt'kà*). From the tip of Siberia, opposite Alaska, the long bleak peninsula of Kamchatka extends south for about 750 miles. From its tip a chain of islands, the Kuriles (Chishima) connects it with Japan, about 700 miles southwest. Since the Aleutians approach it on the east, it is a stepping-stone on a land-and-island route between the United States and Japan.

In latitude and climate it resembles Labrador. Snows bury it in winter, monsoons drench it in summer, and fog shrouds its coasts for most of the year. The entire Kamchatka region covers about 105,000 square miles and has a population of 150,000 (1939 census). This includes the peninsula which has an area of about 70,000 square miles and a population of 135,000. Many of the inhabitants are native nomads who live by hunting and fishing. Others are Russian settlers who raise cattle and a few hardy crops on large state farms. The main port and town is Petropavlovsk. A 3,000-foot ridge rises in the center. In the southeast

is a higher ridge crowned with volcanoes, some active. Klutchevskaya (16,130 feet) is the highest peak in Siberia. Willows, birches, larches, and firs clothe the mountains. Berries grow on the Arctic tundra in the short summer. Reindeer are the natives' meat. Wild animals are the brown bear, sable, otter, fox, hare, wolf, and goat antelope.

GRAY KANGAROOS IN SWIFT FLIGHT



They are moving in jumps 7 feet high and perhaps 25 feet long. Coming down on their hind feet and tails, they immediately spring again. The legs of the one on the right are coming forward for his 3-point landing. The photographer was hidden in the ditch.

KANGAROO. When Capt. James Cook was exploring the coast of Australia in 1770, his men were amazed by a strange animal. At times it stood upright, braced on its hind legs and huge tail. It moved by prodigious leaps. Thus white men first met the great gray kangaroo, the "boomer" or "old man" of Australia.

More than a hundred species of the kangaroo family live in the open spaces of Australia, New Guinea, and near-by islands. They belong to the marsupial order (animals that carry their young in pouches). It is distinguished from the other marsupial families by a remarkable adaptation of body form for jumping. The kangaroo family must not, however, be confused with the so-called kangaroo rats, the jerboas, and similar jumping rodents of America, Africa, and Asia.

The great gray kangaroo reaches a weight of 200 pounds and a length of ten feet from nose to tip of tail. The tail alone is about four feet long, and the powerful muscles at the base make it nearly as thick as the animal's body. On each of the hind feet are four toes. The second from the outside is much stronger and longer than the others and ends in a huge claw. This toe and the shorter outside toe are used in the leaps that can carry the kangaroo at 40 miles an hour. The two slender inside toes are closely joined by a growth of skin and are used only for scratching.

Three-fourths of the animal's bulk lies in its hindquarters. The front legs are short and slender, with small five-toed paws. These are used like hands in grasping food, but are drawn up against the breast in jumping.

How Young Develop

The female has a large pouch on the abdomen formed by a fold in the soft furry skin. When the single, inch-long, naked young is born, it finds shelter in this pouch. There it attaches itself to one of the mother's nipples, which swells inside its mouth so that for several weeks the young kangaroo cannot loosen its grip. It is unable at first to draw out milk for itself or to swallow it. The mother is provided with muscles for pumping her milk down the tiny throat.

After about four months the young kangaroo, called a "joey" in Australia, is able to lean out of the sheltering pouch and nibble grass when its mother bends over to graze. Presently it climbs out and learns to hop around in search of food, but continues for several weeks longer to climb back into the pouch for sleep and safety. If a sudden danger threatens while the young kangaroo is some distance away, the mother will start toward it at full speed, gather it up in her forepaws as she passes, and tuck it into her pouch without seeming to check her flight.

Nearly as large as the great gray kangaroo are the red kangaroo and the more stocky wallaroo. Next in size are various species popularly known as wallabies. These larger types are usually found in small groups

or "mobs" that move from place to place, feeding on grass, shrubs, and the leaves of small trees. Their keen noses, ears, and eyes warn them of danger from hunters or from dingoes or wild dogs—their only important foes. Kangaroos are hunted because of the damage they do to crops and for their tender flesh and their skins which produce fine leather.

Timid as it is, the kangaroo fights desperately when cornered. It stamps its hind feet and growls. With its front paws it tries to push attackers down within reach of a forward slashing blow from the terrible claws on its back feet. It can rip a dog

to death with a single stroke. When pursued by a pack, a kangaroo sometimes takes to the water and, if a dog swims out in pursuit, the kangaroo seizes it and holds it under the surface until it is drowned.

The smaller kangaroos, such as the rock wallabies, the hare wallabies, and the rat-kangaroos, live in secluded retreats among cliffs or dense thickets. A few species have become adapted to tree life. These tree kangaroos have much shorter hind legs and longer forelegs than the others of the family. They do not hop but climb among the branches like small slender bears. Some of these smaller kangaroos eat berries and small insects as well as grass and leaves.

Fossil remains of about 30 different kangaroo species have been found in Australia. Among them were several giant types, one of which is estimated to have stood fully ten feet tall.

HOW MOTHER CARRIES YOUNG



This young kangaroo has nearly outgrown its mother's pouch. But it will continue to seek warmth and shelter there until the mother refuses to carry it any longer. When it is about ten months old the mother will leave it.

Kangaroos constitute the family *Macropodidae* of the marsupial order (*Marsupialia*). The great gray kangaroo is *Macropus giganteus*. Representatives of other marsupial families are the phalangers (*Phalangeridae*), including the cuscus, the koala, and several Australian opossums; the wombats (*Phascolomyidae*); the bandicoots (*Peramelidae*); the Tasmanian devil (*Dasyuridae*); the Tasmanian wolf (*Thylacynidae*); the banded ant-eater (*Myrmecobidae*); the marsupial mole (*Notoryctidae*); and the true opossums (*Didelphidae*), including the common opossum of North America and several South American species.

The helplessness at birth described above in the case of the great gray kangaroo is typical of all marsupials. The young do not reach inside the mother's body the same degree of development as do the young of the higher mammals. They are born sooner and complete the early stages of their development in the mother's pouch. Marsupials are also distinguished from the higher mammals by certain peculiarities of bones and teeth.

The place of the marsupials in the evolutionary scale lies between the most primitive egg-laying mammals, such as the duckbill or platypus and the spiny ant-eater of the order *Monotremata*, and the higher orders which include all the remaining mammals. (See also Australia; Duckbill; Opossum; Tasmania.)

The "SUNFLOWER" STATE'S Fertile PRAIRIES



Kansas Agriculture Usually Supplies More Wheat to the Nation Than Any Other State

KANSAS. In many ways, Kansas is the true "center of the United States." The actual geographic center of the country is in the state. The people combine the ways and thinking of the East and the Far West and the North and the South in their own manner of living. The state itself stands on the dividing line between the East, where rainfall is abundant, and the much drier plains of the West.

Kansas is an almost perfect rectangle. Only the northeastern corner is cut off by the Missouri River. The entire state slopes gently upward from its eastern border toward the foothills of the Rocky Mountains.

The Lay of the Land

The Kansas River, in the north, and the Arkansas, in the south, divide the state crosswise into two long, shallow valleys. In Indian times the tribes wandered along these rivers. Later, white explorers followed them across the plains. The Sante Fe transcontinental trail turned south from Kansas City to the Arkansas and then followed the river across the Kansas of today. Wherever the white man disturbed the soil along these trails, a hardy pioneer, the sunflower, sprang up. Today it is the state flower.

Kansas has no mountains, no marshes (except a few salt marshes), and few natural bodies of water. However, many man-made lakes and ponds have been created, including Kanopolis, Fall River, and Cedar Bluff reservoirs. Only in the northeast corner have geographic features determined the boundaries. This is the result of political experiment when the nation was divided over slavery (*see* Kansas-Nebraska Act).

Eastern Kansas is a region of low hills and fertile valleys. Western Kansas is a vast rolling plain,

dry and almost treeless. In eastern Kansas, early settlers found good soil, with plenty of rain and sunshine for corn and general farming; but they considered western Kansas part of the Great American Desert. Short, tough buffalo grass carpeted the sun-baked plains, where herds of buffalo, antelope, and wild horses roamed. Today eastern Kansas is dotted with farms much like those in states to the east. In western Kansas, the buffalo grass has given way to fields of red-gold grain. These normally supply one fifth of the nation's wheat.

The division between the eastern and western parts runs through Salina and Wichita. East of this line the rainfall increases gradually from about 30 inches a year to 42 at the border. To the west it tapers off to about 16 inches.

Kansas also has extreme changes in temperature. Temperatures have gone between 30 and 40 degrees below zero in winter and from 95° F. to as high as 121° in summer. The average winter temperatures, however, run from 25° to 35° (in the northern part). Summer temperatures average between 75° and 80°.

The *geographic* center of the United States is about two miles from Lebanon, in Smith County. The *geodetic* center of the country is also in Kansas (*see* Surveying). It is just south of the geographic center at a point in Osborne County slightly west of the place where Osborne, Mitchell, and Lincoln counties meet. All geodetic surveys in the United States, Mexico, and Canada are keyed to this point.

The Pioneers and Wheat

Pioneer settlers in Kansas found life there almost unbearably hard. Many left, carrying with them har-

THE NATION'S LEADING WHEAT-PRODUCING STATE



Early explorers considered the dry, windy plains of central and western Kansas uninhabitable. Today farm machinery hums where buffalo once grazed. Scientific methods and Kansas persistence have turned the plains into vast fields of red-gold wheat. Eastern Kansas is not a part of the plains area. It is hilly and fairly moist. Here farms are smaller and farmers grow a variety of crops.

rowing tales of tornadoes and grasshoppers, blizzards and hot winds, droughts and floods. Others stayed on, adapted themselves to conditions, and reaped harvests that in time made the name of Kansas stand for prosperity. Kansas has held its position as an important agricultural state in spite of occasional years of severe drought (see Drought).

In eastern Kansas the settlers raised corn. This paid better than wheat, especially when it was used as feed for hogs and cattle. Western Kansas was too dry for the varieties of wheat the settlers brought from the East. Then, in 1874, Mennonite settlers from Russia introduced a tougher kind. This was a hard winter wheat which had thrived on the dry plains of southern Russia. The Mennonites called it Turkey Red because the seed had come from Turkey and the grain was reddish. It was well suited to the soil and climate of cen-

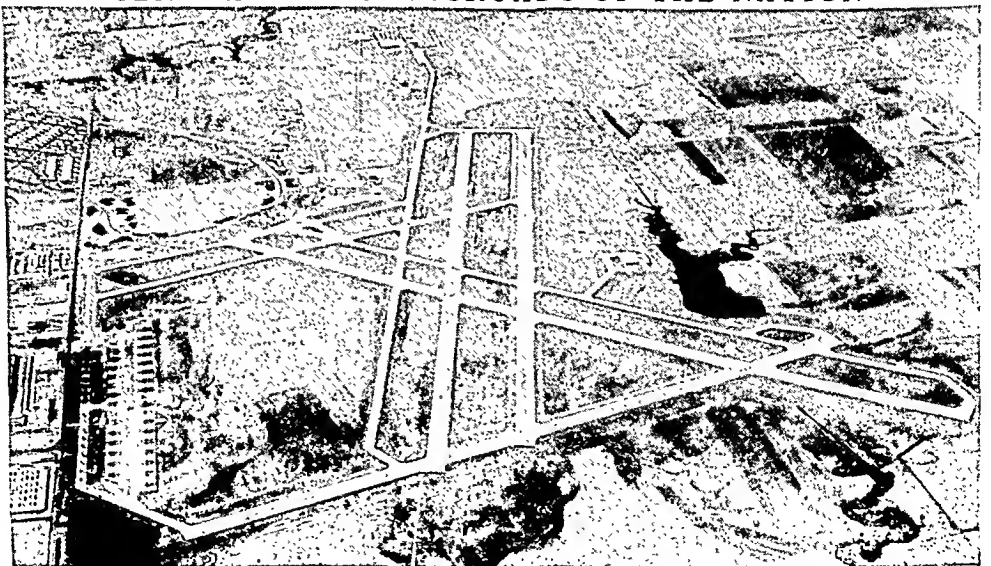
tral and western Kansas, and it made excellent flour. It established the state as a great wheat-producing area. By breeding thousands of strains of Turkey Red, the state agricultural college developed even better varieties, notably Kan-red, Tenmarq, and Blackhull.

Today Kansas produces more wheat than any other state. An average crop is about 194 million bushels, but the peak of 1952 was 308 million bushels. Kansas wheat is used extensively for blending with

other kinds. It is said that almost every sack of high-grade flour produced in the United States contains some Kansas hard winter wheat.

Corn is the second great crop. The corn belt takes in the northeastern corner of the state and some of the counties along the northern border. Farmers use this corn to feed hogs. Eastern Kansas has general farming, which includes dairying and poultry raising, and such crops as soft wheat, corn, and oats.

CENTRAL AIR CROSSROADS OF THE NATION



Here we see Wichita's Municipal Airport, as people see it when they approach in great transcontinental air liners. The longest runway is almost a mile and a half long and 300 feet wide. Freedom from fog and flat ground for landing fields have made Wichita an important air-traffic center. The city is also noted for its manufacture of airplanes. At the far left is part of the Boeing aircraft plant.

Continued on page 13



KANSAS (Kan.): Named for the "Kansa" tribe of Sioux Indians, who once lived along the banks of the Kansas River. "Kansa" in Sioux language means "wind people."

Nickname: "Sunflower State," for its abundant growth of sunflowers. Also known as the "Jayhawker State."

Seal: Rising sun indicates east; settler plowing represents agriculture; steamboat suggests commerce; wagon train, Indians, and buffalo for early history.

Motto: Ad Astra per Aspera (To the Stars through Difficulties).

Flag: For description and illustration, see Flags.

Flower: Wild sunflower. **Bird:** Western meadowlark.

Tree: Cottonwood. **Song:** 'Home on the Range'—words, Brewster Higley; music, Dan Kelly.

THE GOVERNMENT

Capital: Topeka (since 1861).

Representation in Congress: Senate, 2; House of Representatives, 6. Electoral votes, 8.

State Legislature: Senators, 40; term, 4 years. Representatives, 125; term, 2 years. Convenes 2d Tuesday in January in odd-numbered years. No limit to length of session but only 50 days with pay.

Constitution: Adopted 1861. Amendment must be (a) passed by a two-thirds vote of the legislature and (b) ratified by a majority voting on amendment at an election.

Governor: Term, 2 years. May succeed himself.

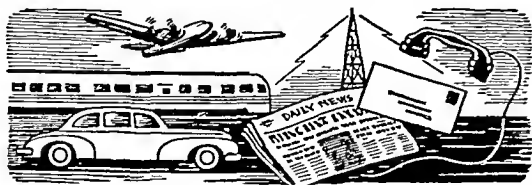
Other Executive Officers: Lieutenant governor, secretary of state, attorney general, treasurer, auditor, superintendent of public instruction, commissioner of insurance, printer, all elected for 2 years.

Judiciary: Supreme court—7 justices, elected at large; term, 6 years. District courts—40; judges elected; term, 4 years. Probate courts—1 in each county; judges elected; term, 2 years.

County: 105 counties, each governed by a county board of 3 members. County board elected; term, 4 years. Other county officers elected; term, 2 years.

Municipal: Mayor and council form of government most common; some cities have commission or manager-commission form.

Voting Qualifications: Age, 21; residence in state, 6 months; ward or township, 30 days.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 8,500 miles. First railroad, Elwood to Wathena, 1860. Rural roads, 126,000 miles. Airports, 184.

Communication: Periodicals, 96. Newspapers, 393. First newspapers, *Shawnee Sun* (in Shawnee language), Wyandotte County, 1835; *Kansas Weekly Herald*, Leavenworth, 1854. Radio stations (AM, FM), 40; first station WEY, Wichita, licensed March 23, 1922. Television stations, 1; KTVH, Hutchinson, began operation July 1, 1953. Telephones, 673,800. Post offices, 905.

THE PEOPLE AND THEIR LAND

Population (1950 census): 1,905,299 (rank among 48 states—31st); urban, 52.1%; rural, 47.9%. Density: 23.2 persons per square mile (rank—36th state).

Extent: Area, 82,276 square miles, including 168 square miles of water surface (13th state in size).

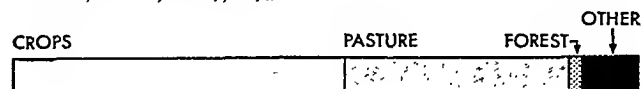
Elevation: Highest, in Wallace County, 4,135 feet; lowest, Verdigris River, at state's southern boundary, 700 feet.

Temperature (°F.): Average—annual, 55°; winter, 32°; spring, 54°; summer, 77°; fall, 57°. Lowest, —40° (Lebanon, Feb. 13, 1905); highest, 121° (near Alton, July 24, 1936, and other locations and earlier dates).

Precipitation: Average (inches)—annual, 27; winter, 3; spring, 8; summer, 10; fall, 6. Varies from about 16 in extreme central west to about 42 in southeast.

Natural Features: Central low plains slope gently upward toward foothills of Rocky Mountains on the state's western border. Eastern area includes "Blue-stem Hills," a region of low hills and fertile valleys. This seemingly flat land rises nearly 3,000 feet from east to west. Principal rivers: Arkansas, Kansas, Neosho, Republican, Smoky Hill, Solomon.

Land Use: Cropland, 53%; nonforested pasture, 36%; forest, 2%; other (roads, parks, game refuges, waste-land, cities, etc.), 9%.



Natural Resources: *Agricultural*—rich sod of flat western plains ideal for large-scale wheat growing; eastern soil, with silt deposits and ample precipitation, suited to corn and diversified farming. *Industrial*—minerals (petroleum, cement, natural gas, coal, stone, zinc). *Commercial*—geographic center of United States; barge traffic on Kansas and Missouri rivers.

OCCUPATIONS AND PRODUCTS

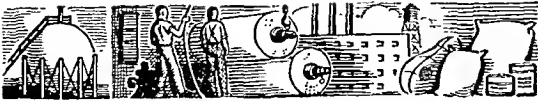
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Agriculture, forestry, and fishery	162,879	22.9
Wholesale and retail trade	137,103	19.4
Manufacturing	88,922	12.6
Transportation, communication, and other public utilities	67,775	9.6
Professional services (medical, legal, educational, etc.)	63,285	8.9
Construction	50,345	7.1
Personal services (hotel, domestic, laundering, etc.)	35,201	5.0
Government	29,203	4.1
Finance, insurance, and real estate	20,330	2.9
Business and repair services . . .	18,157	2.6
Mining	14,756	2.1
Amusement, recreation, and related services	6,363	0.9
Workers not accounted for	13,302	1.9
Total employed	707,621	100.0

Kansas Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—28th) Value added by manufacture* (1952), \$868,825,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
FOOD AND KINDRED PRODUCTS..... Flour and meal; meat packing; bakery products; dairy products	\$151,922,000	18
CHEMICALS AND ALLIED PRODUCTS (Such as explosives; industrial in- organic chemicals; soap and glycer- in; vegetable and animal oils, etc.)	66,990,000	19
TRANSPORTATION EQUIPMENT..... (Such as aircraft and parts; motor vehicles, equipment, etc.)	51,344,000	17
PETROLEUM AND COAL PRODUCTS... Petroleum refining	51,118,000	11
MACHINERY (EXCEPT ELECTRICAL). Tractors, farm machinery; con- struction and mining machinery	28,024,000	22

*For explanation of value added by manufacture, see Census.



B. Farm Products (Rank among states—6th) Total cash income (1952), \$1,187,722,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Wheat.....	193,512,000 bu.	1	1
Cattle.....	1,082,348,000 lbs.	2	3
Corn.....	68,239,000 bu.	3	11
Hogs.....	495,963,000 lbs.	4	11
Milk.....	1,382,000,000 qts.	5	13
Eggs.....	163,000,000 doz.	6	11
Sorghums, grain..	22,479,000 bu.	7	2
Sorghums, forage.	2,363,000 tons		
Hay.....	2,792,000 tons	8	14
Oats.....	34,735,000 bu.	9	12
Chickens.....	100,972,000 lbs.	10	17

*Rank in dollar value. †Rank in units produced.



C. Minerals (Fuels, Metals, and Stone)

Annual value (1951), \$400,087,000
Rank among states—10th

Minerals (1951)	Amount Produced	Value
Petroleum.....	114,522,000 bbls.	\$294,320,000
Natural gas.....	417,538,000,000 cu. ft.	33,821,000
Cement.....	8,164,000 bbls.	19,413,000
Zinc.....	29,000 tons	10,521,000
Natural-gas liquids.	4,266,000 bbls.	9,376,000
Stone.....	7,192,000 tons	9,059,000

D. Trade

Trade (1948)	Sales	Rank among States
Wholesale.....	\$2,094,230,000	21
Retail.....	1,689,396,000	23
Service.....	122,433,000	29

EDUCATION

Public Schools: Elementary, 3,242; secondary, 615. Compulsory school age, 7 through 15. State Board of Education composed of 7 members, appointed by governor, 3-year terms. State supt. of public instruction, elected, 2-year term. County supts., elected, 2-year terms. City boards of education, elected, appoint city superintendents.



Private and Parochial Schools: 229.

Colleges and Universities (accredited): Colleges, 21; junior colleges, 22. State-supported schools include the University of Kansas, Lawrence; Fort Hays Kansas State College, Hays; Kansas State College of Agriculture and Applied Science, Manhattan; Kansas State Teachers College, Emporia; Kansas State Teachers College, Pittsburg.

Special State Schools: School for the Blind, Kansas City; School for the Deaf, Olathe; Kansas Technical Institute, Topeka.

Libraries: City and town public libraries, 286; 13 independent county library systems; 4 counties contract for service with city libraries. State library and Traveling Libraries Commission aid in developing libraries. Noted special library: State Historical Library, Topeka.

Outstanding Museums: Museum of Art, and Museum of Natural History, University of Kansas, Lawrence; Wichita Art Museum, and Wichita Public Museum, Wichita; Kansas State Historical Museum, Topeka.

CORRECTIONAL AND PENAL INSTITUTIONS

Boys' Industrial School, Topeka; Girls' Industrial School, Beloit; State Industrial Farm for Women, Lansing; Kansas State Industrial Reformatory (for men), Hutchinson; Kansas State Penitentiary, Lansing.

PLACES OF INTEREST*

Atchison—homes of John Ingalls and Edgar Howe (7).
Capitol Building—John Steuart Curry murals (see Topeka) (16).

Carry Nation House—Medicine Lodge; home of temperance leader (44).

Chalk Bluffs (Gove County Badlands)—series of shallow canyons and towering chalk formations (20).

Coal Strip Mines—near Pittsburg; world's largest electric shovels (42).

Council Grove—important point on Santa Fe Trail; (27).

Dodge City—early cowboy capital; in Boot Hill Cemetery, Cowboy Statue and Longhorn Statue (36).

El Quartejejo—remains of old pueblo occupied by Pueblo Indians 1650-1720 (25).

Fall River Dam—for flood control and water supply; 94 ft. high, 6,455 ft. long; southwest of symbol (34).

Fort Leavenworth—frontier outpost; headquarters of first territorial governor; now military reservation (9).

Fort Riley—large, permanent army post (15).

Fort Scott—buildings of old fort built in 1842 (35).

Greensburg—largest hand-dug well in the world (37).

Hanover—original Pony Express station (3).

Haskell Institute—at Lawrence; largest Indian school in the United States; founded 1884 (24).

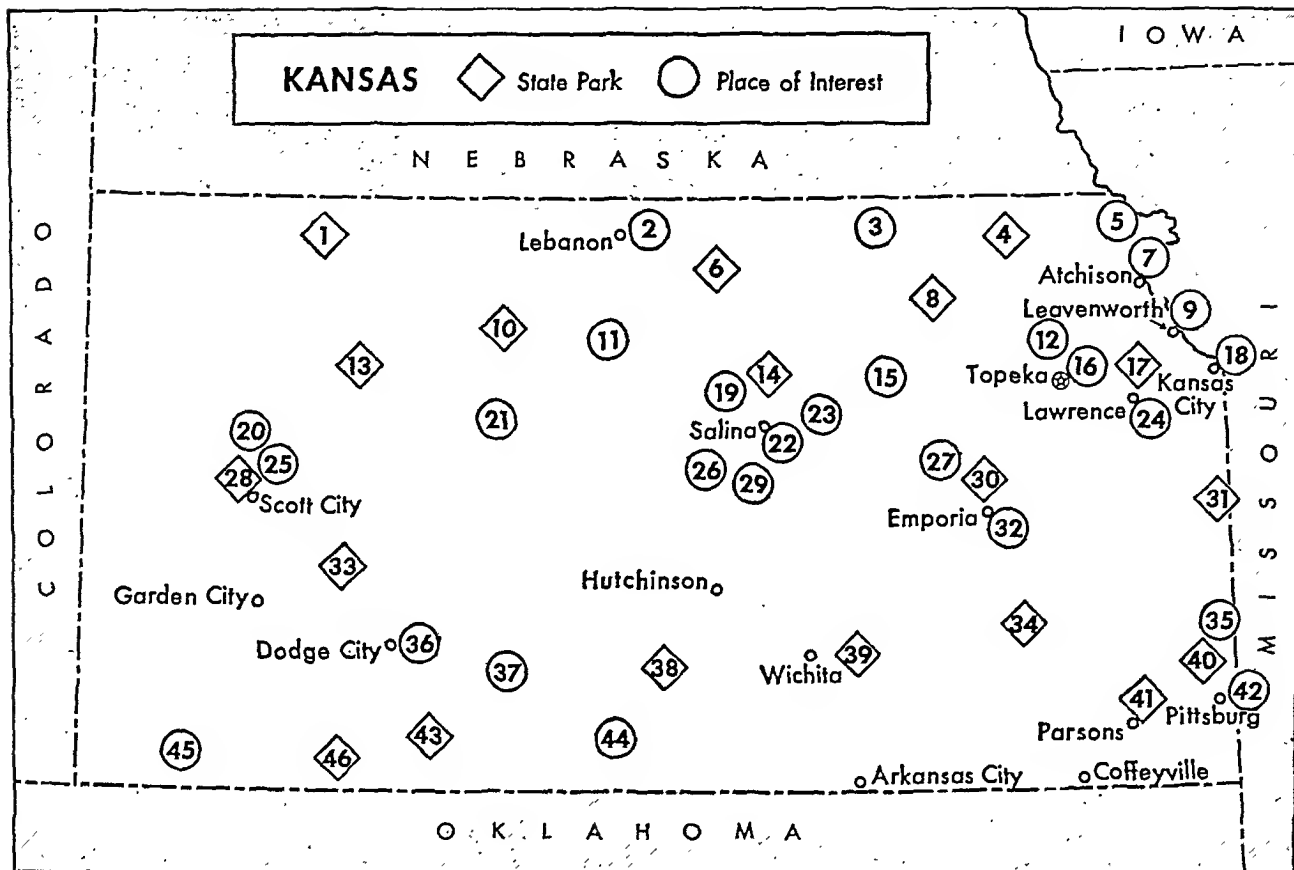
Hays—historic blockhouses and guardhouse from old Fort Hays, established 1865 (21).

Highland—restored Presbyterian Mission for Indians (5).

Hugoton—world's largest natural-gas field (45).

*Numbers in parentheses are keyed to map.

Kansas Fact Summary



Indian Ossuary—at Salina; skeletal remains of 140 Indians, believed to be of the Plains tribe (22).

Kanopolis Dam—flood control dam on Smoky Hill R. near Ellsworth; 131 feet high and 15,810 feet long (26).

Lebanon—near geographic center of United States (2).

Lindsborg—annual presentation of Handel's 'Messiah' since 1882 (29).

Meade's Ranch—geodetic center of the United States in Osborne County (11).

"Pawnee Capitol"—restored Territorial Capitol on Fort Riley reservation (15).

Potawatomi Reservation—largest Indian reservation in Kansas (12).

President Dwight Eisenhower Home—Abilene; souvenirs collected by the president; museum nearby (23).

"Red Rocks"—William Allen White home, Emporia (32).

Rock City—15 unique geologic formations (19).

Shawnee Methodist Mission—near Kansas City (18).

STATE PARKS*

Buffalo Refuge—near Garden City; buffalo herd; sand hills and dunes; southwest of (33).

Butler County—near Augusta; lake formed by dam on Indianola Creek; wildlife refuge (39).

Cheyenne Bottoms—near Great Bend; waterfowl refuge and public shooting grounds in great natural depression; fishing in 5 pools formed by dikes; n.e. of (37).

Clark County—in Bluff Creek canyon near Kingsdown; lake; deep ravines; canyons (43).

Crawford County No. 1—nr. Pittsburg; strip mines form lakes; forest park, bird sanctuary, game preserve (40).

Crawford County No. 2—near Farlington; dam forms lake; walnut forest (40).

Decatur County No. 1—near Oberlin; lake created by dam on Wildcat Creek (1).

Decatur Dam No. 2—near Oberlin; dam across Sappa Creek impounds lake (1).

Finney County—near Garden City; lake; migratory waterfowl refuge; rock formations (33).

Kearny County—Lake McKinley near Lakin; s. of (28).

Kingman County—near Kingman; dam creates lake; game sanctuary; quail farm (38).

Leavenworth County—near Lawrence; lake; game sanctuary; rugged hardwood forest (17).

Lyon County—near Emporia; lake (30).

Maxwell Game Preserve—near Canton; buffalo, elk, deer, and small game on rugged pasture land; s.e. of (29).

Meade County—near Meade; game preserve, fish hatchery; pheasant farm; lake (46).

Miami County—near Paola; lake (31).

Nemaha County—near Seneca; Nemaha River dam forms lake; game sanctuary (4).

Neosho County—near Parsons; McKinley Lake in a deep ravine off Neosho River (41).

Ottawa County—near Minneapolis; game preserve; bird sanctuary and hatchery; lake (14).

Pottawatomie County—near Westmoreland; dam creates lake; game sanctuary (8).

Republic County—near Jamestown; lake; game sanctuary (6).

Rooks County—nr. Stockton; lake; game sanctuary (10).

Scott County—nr. Scott City; dam, Lake McBride; site of Indian pueblo El Quartejejo (1650-1720) (28).

Sheridan County—near Hoxie; lake formed by dam across Saline River (13).

Woodson County—near Yates Center; Lake Fegan; game sanctuary; forests on hills (34).

*Numbers in parentheses are keyed to map.

Kansas Fact Summary

LARGEST CITIES (1950 census)

Wichita (168,279): grain market; meat packing and flour milling; manufactures airplanes; oil refining.
Kansas City (129,553): large meat-packing industry; oil refining; grain elevators; hay, livestock market.
Topeka (78,791): state capital; meat packing; railroad shops; tire and rubber manufacturing.
Hutchinson (33,575): salt mines, flour mills, grain elevators.
Salina (26,176): flour milling; meat packing.
Lawrence (23,351): canning factories; flour, feed mills.
Leavenworth (20,579): steel and wood products, batteries, greeting cards; federal and state penitentiaries.
Pittsburg (19,341): coal shipping; chemical fertilizer.
Manhattan (19,056): canneries; Kansas State College.
Coffeyville (17,113): oil refining, zinc-oxide smelting.

THE PEOPLE BUILD THEIR STATE

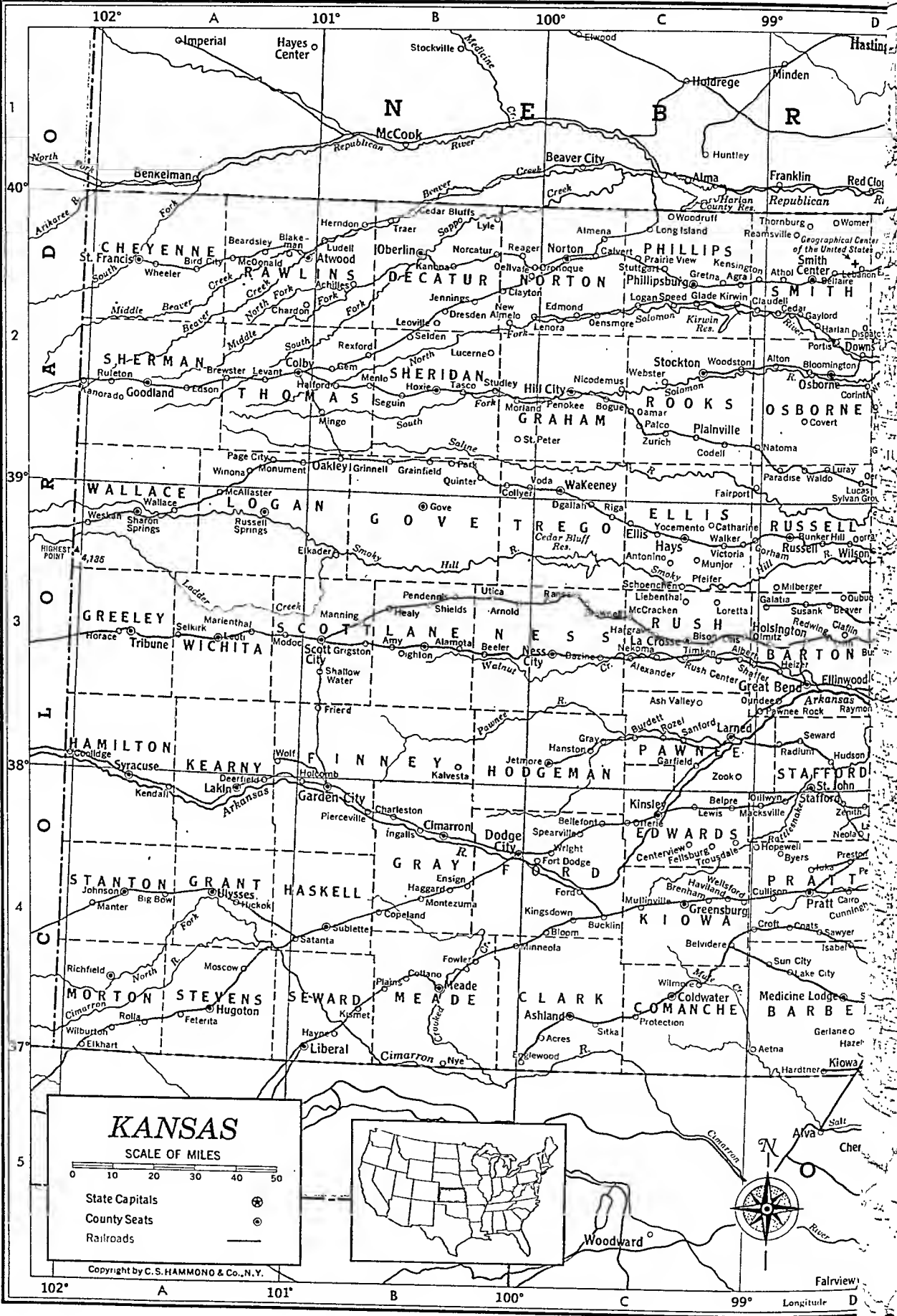
1541—Francisco de Coronado leads expedition from southwest in search of fabled Seven Cities of Cibola; probably crosses part of what is now Kansas.
1601—Juan de Oñate, governor of New Mexico, hunting for gold and silver, enters Kansas region.
1682—Kansas included in Louisiana region claimed for France by René Robert Cavelier, Sieur de La Salle.
1720—Pedro de Villasur leads expedition to drive French from Plains region, probably crosses Kansas; he is killed and party routed near Platte River.
1723—French build Fort Orléans near mouth of Osage River; Étienne de Bourgmont explores Kansas.
1762—French cede all territory west of Mississippi River to Spain. Spain secretly returns it, 1800.
1803—Napoleon sells Louisiana region to U. S.
1804—Kansas included in District of Louisiana under jurisdiction of Indiana Territory; becomes part of Louisiana Territory, 1805. Meriwether Lewis and William Clark en route to Pacific enter Kansas.
1806—Zebulon M. Pike explores Republican River region.
1812—Territory of Missouri created.
1815—Osage Indians forced to move from Missouri to Kansas; they cede much of their land, 1825; the remainder, 1865; move to Oklahoma by 1870.
1819—*Western Engineer* is first steamboat in Kansas.
1820—Presbyterian missions established on Neosho and Marais des Cygnes rivers.
1821—William Becknell opens route of Santa Fe Trail.
1823—Kansas-Missouri border definitely fixed.
1825—Kansa (Kaw) Indians cede most of their land, accepting reservation in Shawnee County; move to Council Grove, 1846; move to Oklahoma by 1873. Pawnee Indians sign peace treaty with U. S.
1827—Fort Leavenworth established. Daniel Morgan Boone, son of Daniel Boone, founds school for Indians in Jefferson County.
1830—Shawnee Methodist Indian Mission established near present Turner; moved to present Shawnee, 1839. Congress legalizes removal of Indians to country west of Mississippi River.
1834—Kansas becomes part of "Indian country."
1842—John C. Frémont leads first of several expeditions through Kansas. Fort Scott established.
1843—Great Migration to Oregon country begins.
1849—California gold seekers follow Kansas trails.
1850—Military road links Fort Leavenworth and Fort Kearney (Neb.). Stage route opened to Pacific.
1852—First flour mill built near site of Kansas City.



1853—Fort Riley established.
1854—Kansas-Nebraska Act creates Kansas Territory; settlers to decide slavery issue; governor, Andrew H. Reeder; capital, Leavenworth, later moved to Shawnee Mission. Proslavery and antislavery settlers rush into territory. Leavenworth, Lawrence, Atchison, and Topeka founded. Delaware and Shawnee Indians cede lands in eastern Kansas.
1855—First territorial legislature meets at Pawnee and at Shawnee Mission; legalizes slavery. Free State party forms separate government. Proslavery and antislavery groups fight Wakarusa War.
1856—Proslavery men sack Lawrence; in revenge John Brown leads free-state raiders in Potawatomie Massacre; warfare continues until 1858.
1857—Lecompton Constitution rejected by people.
1859—Wyandotte Constitution rejecting slavery adopted. Atchison and Topeka R.R. chartered; rechartered Atchison, Topeka and Santa Fe, 1863; begins line through Kansas along Santa Fe Trail, 1868; reaches western border of Kansas, 1872.
1860—Pony Express crosses Kansas en route to West. First oil well in Kansas drilled near Paola.
1861—Kansas admitted to Union as 34th state, Jan. 29; first governor, Charles Robinson; capital, Topeka. Arapahos and Cheyennes cede their lands.
1862—Passage of Homestead Law encourages settlement.
1863—Confederates led by Wm. Quantrill sack Lawrence. Congress passes law to remove Indians from Kansas.
1864—Kansas-Pacific R. R. reaches Lawrence. Gen. Sterling Price leads Confederate raiders into Kansas.
1865—Kiowa and Comanche Indians cede their lands; leave state by 1878. Univ. of Kansas founded.
1867—First herd of Texas cattle driven to Kansas.
1872—Lead and zinc deposits found in Cherokee County.
1873—Natural gas discovered near Iola.
1874—Mennonite pioneers from Russia introduce Turkey Red wheat to U.S. Locusts devastate farms.
1876—Pawnees cede their lands; move to Oklahoma.
1878—Cheyenne raid is state's last Indian trouble.
1880—Kansas is first state to adopt prohibition by constitutional amendment.
1885—Peak of agricultural "boom" reached; drought in 1887 brings collapse.
1886—Heavy blizzards destroy cattle; western cattle ranges give way to homesteads.
1887—First salt in state found near Hutchinson.
1889—Kansas adopts first state antitrust laws. About 55,000 Kansans move to newly opened lands in Oklahoma. First beet-sugar and salt refining begun.
1899—Carry Nation begins her saloon-smashing raids.
1911—"Blue sky" law enacted to protect investors.
1929—Drought creates Dust Bowl in state; ends 1936.
1948—Kanopolis Dam on Smoky Hill River completed. Voters repeal prohibition law; effective, 1949.
1949—Fall River Dam on Fall River completed.
1951—Most destructive flood in U. S. history devastates much of central and eastern Kansas. Cedar Bluff Dam on Smoky Hill River completed.
1952—Dwight D. Eisenhower, whose boyhood home is in Abilene, elected 34th president of U. S.
1953—Federal aid given in severe drought. Turnpike commission established; Kansas City-Topeka-Wichita-Oklahoma pike studied.
1954—Centennial of Kansas Territory celebrated. U. S. Supreme Court bans segregation in public school in five cases, one involving Kansas. Dust storms cause wind erosion damage.

KANSAS

COUNTIES																			
Allen	18,187	G 4		Adams	175	E 2		Brantford	23	E 2		Culver	153	E 3		Garden City	10,905	E 4	
Anderson	10,267	G 3		Adams	45	E 4		Brazilton	75	H 4		Cummings	52	G 2		Garden Plain	323	E 4	
Atchison	21,496	G 2		Admire	184	F 3		Bremen	80	F 2		Cunningham	510	D 4		Gardner	676	H 3	
Barber	8,521	D 4		Agenda	159	E 2		Brenham	21	C 4		Damar	305	C 2		Garfield	297	C 3	
Barton	29,909	D 3		Agra	354	G 2		Brewster	467	A 2		Danville	122	E 4		Garfield Center		E 2	
Bourbon	19,153	H 4		Agriola	30	G 3		Bridgeport	53	E 3		Day	6	E 2		Garland	280	H 4	
Brown	14,651	G 2		Alamata	39	B 3		Bronson	415	H 4		De Graff	30	F 4		Garnett	2,693	G 3	
Butler	31,001	F 4		Albert	218	C 3		Brookville	213	E 3		De Soto	518	H 3		Garrison	80	F 2	
Chase	4,831	F 3		Alden	286	D 3		Broughton	96	E 2		Dearing	261	G 4		Gas	294	G 4	
Chautauqua	7,376	F 4		Alexander	188	C 3		Brownell	211	C 3		Deerfield	440	A 4		Gaylord	231	D 2	
Cherokee	25,144	H 4		Aliceville	100	G 3		Buckley	15	E 2		Delavan	75	F 3		Gem	118	B 2	
Cheyenne	5,668	A 2		Alida	81	F 2		Bucklin	824	C 4		Della	184	G 2		Geneseo	660	D 3	
Clark	3,946	C 4		Alki	10	F 3		Bucyrus	131	H 3		Delvalle	12	B 2		Gerlane	2	D 4	
Clay	11,697	E 2		Allan	241	F 3		Buffalo	437	G 4		Delphos	676	E 2		Geuda Sprs.	245	E 4	
Cloud	16,104	E 2		Alma	716	F 2		Buffville	50	G 4		Denison	166	G 2		Girard	2,426	H 4	
Coffey	10,408	G 3		Almena	616	C 2		Buhler	750	E 3		Denmark	50	D 2		Glade	107	C 2	
Comanche	3,888	C 4		Alta Vista	420	F 3		Bunker Hill	271	D 3		Dennis	200	G 4		Glascio	803	E 2	
Cowley	36,905	F 4		Altamont	652	G 4		Burden	541	F 4		Densmore	61	C 2		Glen Elder	582	D 2	
Crawford	40,231	H 4		Alton	317	D 2		Burdett	355	C 3		Denton	157	G 2		Glendale	35	E 3	
Decatur	6,185	B 2		Altoona	582	G 4		Burdick	110	F 3		Derby	432	E 4		Glenloch		G 3	
Dickinson	21,190	E 3		America City	10	F 2		Burlingame	1,065	G 3		Detroit	124	E 3		Goddard	274	E 4	
Doniphan	10,499	G 2		Americus	339	F 3		Burlington	2,304	G 3		Devon	124	H 4		Goessel	270	E 3	
Douglas	34,086	G 3		Ames	67	E 2		Burns	294	F 3		Dexter	354	F 4		Goff	315	G 2	
Edwards	5,936	C 4		Amiot	7	G 3		Burr Oak	505	D 2		Dighton	1,246	B 3		Goodland	4,690	A 2	
Elk	6,679	F 4		Amy	35	B 3		Burrton	749	E 3		Dillon	35	E 3		Goodrich	50	G 3	
Ellis	19,043	C 3		Andale	316	E 4		Burt	35	G 4		Dillwyn	10	D 4		Gordon	75	F 4	
Ellsworth	8,465	D 3		Andover	250	E 4		Busby	42	F 4		Dispatch	17	D 2		Gorham	375	D 3	
Finney	15,092	B 3		Angola	50	G 4		Bush City	65	G 3		Dodge City	11,262	B 3		Gove	206	B 3	
Ford	19,670	C 4		Anness	11	E 4		Bushong	93	F 3		Doniphan	50	G 2		Grainfield	371	B 2	
Franklin	19,928	G 3		Anson	50	E 4		Bushon	532	D 3		Dorrance	365	D 3		Grantville	100	G 2	
Gary	21,671	F 3		Antelope	40	F 3		Byers	83	D 4		Douglass	729	F 4		Gray	12	C 3	
Gove	4,447	B 3		Anthony	2,792	D 2		Calo	40	D 4		Dover	50	G 3		Great Bend	12,665	D 3	
Graham	5,020	C 2		Antonino	75	C 3		Caldwell	2,000	E 4		Dowds	1,221	D 2		Greeley	436	G 3	
Grant	4,638	A 4		Arcadia	572	H 4		Calista	12	D 4		Dresden	162	B 2		Green	219	E 2	
Gray	4,894	B 4		Argonia	562	E 4		Calvert	22	C 2		Dubuc	12	D 3		Greenleaf	614	E 2	
Greeley	2,010	A 3		Arkansas City	12,903	E 4		Cambridge	221	F 4		Duluth	70	F 2		Greensburg	1,723	C 4	
Greenwood	13,574	F 4		Arlington	405	D 4		Canada	38	E 3		Dumdee		D 3		Greenwich	50	E 4	
Hamilton	3,696	A 3		Arma	1,334	H 4		Caney	2,876	G 4		Dunlap	134	F 3		Grenola	380	F 4	
Harper	10,263	D 4		Arnold	108	B 3		Canton	771	E 3		Duquoin	15	D 4		Gretna	12	C 2	
Harvey	21,698	E 3		Arrington	50	G 2		Carbondale	453	G 3		Durham	229	E 3		Gridley	360	G 3	
Haskell	2,606	B 4		Ash Grove	55	D 2		Carlton	76	E 3		Dwight	281	F 3		Grigston	35	B 3	
Hodgeman	3,310	C 3		Ash Valley		C 3		Carlyle	45	G 4		Earlton	141	G 4		Grinnell	364	B 2	
Jackson	11,098	G 2		Asherville	105	D 2		Carneiro	55	D 3		Eastborough	708	E 4		Groveland	10	E 3	
Jefferson	11,084	G 2		Ashland	1,493	C 4		Carona	175	H 4		Easton	255	G 2		Gypsum	523	E 2	
Jewell	9,698	D 2		Ashton	45	E 4		Cassoday	150	F 3		Edgerton	266	H 3		Haddam	375	E 2	
Johnson	62,783	H 3		Assaria	221	E 3		Castleton	64	E 4		Edmond	110	C 2		Haggard	42	B 4	
Kearny	3,492	A 3		Atchison	12,792	G 2		Catharine	218	C 3		Edna	422	G 4		Hale	8	F 4	
Kirman	10,324	D 4		Athol	203	D 2		Cawker City	691	D 2		Edson	70	A 2		Halford	6	B 2	
Kiowa	4,743	C 4		Atlanta	309	F 4		Cedar	86	D 2		Edwardsville	274	H 2		Hallowell	223	H 4	
Labette	29,285	G 4		Attica	622	D 2		Cedar Bluffs	45	B 2		Effingham	525	G 2		Halls Summit	62	G 3	
Lane	2,808	B 3		Atwood	1,613	B 4		Cedar Point	107	F 4		El Dorado	11,037	F 4		Hallville	5	E 3	
Leavenworth	42,361	G 2		Auburn	110	G 3		Cedar Vale	1,010	F 4		Elbing	98	E 3		Halstead	1,328	E 4	
Lincoln	6,643	D 2		Augusta	4,483	F 4		Centerville	30	C 4		Elgin	512	F 4		Hamilton	456	F 4	
Linn	10,053	H 3		Aulne	182	E 3		Centerville	155	H 3		Elk City	224	G 4		Hamlin	118	G 2	
Logan	4,206	A 3		Aurora	221	E 2		Centralia	574	F 2		Elk Falls	276	F 4		Hammond	63	H 4	
Lyon	26,576	F 3		Axtell	510	F 2		Chanute	10,109	G 4		Elkader	5	B 3		Hanover	854	F 2	
Marion	16,307	E 3		Baileyville	150	F 2		Chapman	990	E 3		Elkhart	1,132	A 4		Hanson	286	C 3	
Marshall	17,926	F 2		Bala	50	F 3		Chardon	A 2		Ellinwood	2,569	D 3		Hardtner	373	D 4		
McPherson	23,670	E 3		Baldwin City	1,741	G 2		Charleston	12	B 4		Ellis	2,649	C 3		Hargrave	8	C 3	
Meade	5,710	B 4		Bancroft	26	G 2		Chase	961	D 3		Ellsworth	2,193	D 3		Harlan	125	D 2	
Miami	19,698	H 3		Barclay	47	G 3		Chautauqua	215	F 4		Elmdale	180	F 3		Harper	1,672	D 4	
Mitchell	10,320	D 2		Barker	735	H 2		Cheney	777	E 4		Elmo	50	E 3		Harris	84	G 3	
Montgomery	46,487	G 2		Barnard	242	D 2		Cherokee	849	H 4		Elmont	65	G 2		Hartford	395	F 3	
Morris	8,485	F 3		Barnes	308	F 2		Cherryvale	2,952	G 4		Elmore	152	G 4		Harveyville	236	F 3	
Morton	2,610	A 4		Bartlett	143	G 4		Chetopa	1,671	G 4		Elwood	1,020	H 2		Havana	215	G 4	
Nemaha	14,341	F 2		Baschett	275	G 2		Chicopee	250	H 4		Elyria	65	E 3		Haven	720	E 4	
Neosho	20,348	G 2		Bassett	117	G 4		Chiles	20	H 3		Emmett	143	F 2		Havensville	208	F 2	
Ness	6,322	C 3		Baxter	90	E 4		Cimarron	1,189	B 4		Emporia	15,669	F 3		Haviland	606	C 4	
Norton	8,808	C 2		Baxter Sprs.	4,647	H 3		Cirleville	169	G 2		Englewood	341	C 4		Hawk		E 4	
Osage	12,811	G 3		Bazaar	64	F 3		Clafin	921	D 3		Englewood	150	H 4		Hayne	6	B 4	
Osborne	8,558	D 2		Bazine	456	C 3		Claudell	25	C 2		Enosdale	11	E 2		Hays	8,625	C 3	
Ottawa	7,265	E 2		Beagle	150	G 3		Clay Center	4,528	E 2		Ensign	227	B 4		Haysville	125	E 4	
Pawnee	11,041	C 3		Beardsley	30	A 2		Clayton	157	B 2		Enterprise	795	E 3		Hazelton	250	D 4	
Phillips	9,273	C 2		Beattie	321	F 2		Cleburne	647	E 4		Erie	1,296	G 4		Healy	200	B 3	
Pottawatomie	12,344	F 2		Beaumont	150	F 4		Clements	150	F 3		Esbon	278	D 2		Hedville	39	E 3	
Pratt	12,156	D 4		Beaver	118	D 3		Clifton	743	E 2		Eudora	929	G 3		Heizer	100	D 3	
Rawlins	5,728	A 2		Beeler	100	B 3		Climax	91	F 4		Eureka	3,958	F 4		Hepler	224	H 4	
Reno	54,058	D 4		Bellaire	55	D 2		Clonmel	25	E 4		Everest	363	G 2		Herington	3,775	E 3	
Republle	11,478	E 2		Belle Plaine	971	E 4		Cloverdale	15	F 4		Fact	363	G 2		Herkimer	120	F 2	
Rice	15,635	D 3		Bellefont	35	C 4		Clyde	1,067	E 2		Fairport	35	C 2		Hendon	321	E 2	
Riley	33,405	F 2		Bellefont	2,858	E 2		Coats	255	D 4		Fairview	336	G 2		Hesston	686	E 3	
Rooks	7,231	C 2		Belmont	48	D 4		Codell	100	C 2		Fairway	1,816	H 3		Hewins	200	F 4	
Rush	9,043	C 3		Beloit	4,085	D 2		Coffeyville	17,113	G 4		Fall River	261	G 4		Hiatville	150	H 4	
Russell	13,406	D 3		Belpre	231	C 4		Colby	3,859	A 2		Falun	92	E 3		Hiawatha	3,294	G 2	
Saline	33,409	E 3		Belvidere	52	C 4		Colldwater	1,208	C 4		Farlington	96	H 4		Hickok	37	A 4	
Scott	4,921	B 3		Belvue	193	F 2		Collano	25	B 4		Farlinville	15	H 3		Highland	717	G 2	
Sedgwick	222,290	E 4		Bendena	94	G 2		Collyer	287	G 3		Faulkner	36	H 4		Hill City	1,432	C 2	
Seward	9,972	E 4		Benedict	176	G 4		Colony	387	G 3		Fellsh							



KANSAS

SCALE OF MILES



State Capitals



County Seats

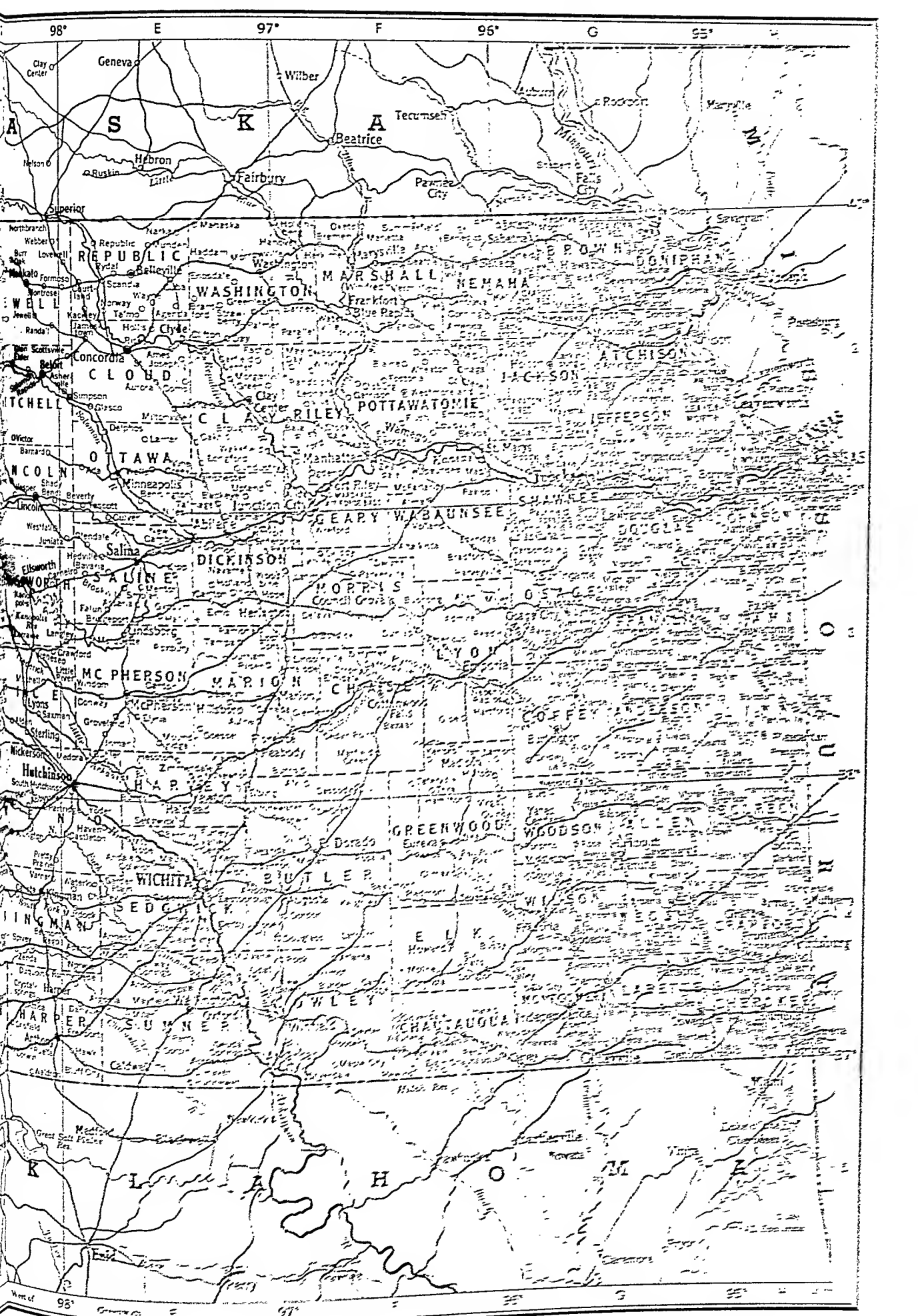


Railroads



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KANSAS — Continued

Hymer	10	F 3	Manchester	151	E 2	Odin	115	D 3	Rosalia	100	F 4	Trading Post	H 3	
Idana	115	E 2	Manhattan	19,056	F 2	Offerle	269	C 4	Rose	50	G 4	Traer	69	B 2
Independence	11,335	G 4	Mankato	1,462	D 2	Ogallah	100	C 3	Rose Hill	200	E 4	Treese	378	H 4
Industry	100	E 2	Manning	22	B 3	Ogden	845	F 2	Roseland	118	*H 4	Tribune	1,010	A 3
Ingalls	173	B 4	Manter	200	A 4	Oh Hill	450	F 4	Rossville	577	E 2	Troutsdale	110	C 4
Inman	615	E 3	Maple City	176	F 2	Oketo	169	F 3	Roxbury	145	E 3	Troy	1,500	G 2
Iola	7,064	G 4	Maple Hill	213	H 3	Oliver	5,598	H 3	Ruella	233	C 3	Turner	632	D 4
Ionia	160	D 2	Marathon	110	A 3	Olmitz	125	D 3	Ruleton	52	A 2	Turon	279	G 4
Iowa Point	110	G 2	Marion	2,050	F 3	Olpe	293	F 3	Runnymede	5	E 4	Udall	410	E 4
Irving	279	F 2	Marquette	666	E 3	Olzburg	140	F 2	Rush Center	350	C 3	Ulysses	2,243	A 3
Isabel	205	D 4	Marvsville	3,866	F 2	Onaga	882	F 2	Russell	6,483	D 3	Uniontown	232	G 4
Iuka	129	D 4	Matfield Green	119	F 3	Onida	138	G 2	Russell Springs	161	A 4	Upland	25	E 2
Jamestown	494	E 2	May Day	27	F 2	Opolis	160	H 4	Rydal	42	E 2	Urbana	70	G 4
Jarhalo	75	G 2	Mayetta	247	G 2	Oronoque	26	C 2	Sabatha	2,173	G 2	Utica	365	B 3
Jefferson	50	G 4	Mayfield	134	E 4	Osage City	1,919	G 3	Saffordville	110	F 3	Valeda	125	G 4
Jennings	330	B 2	McAllister	35	A 3	Osawatimie	4,347	H 3	Saint Benedict	150	F 2	Valley Center	854	E 4
Jettmore	988	B 3	McCracken	553	C 3	Osborne	2,068	D 2	Saint Clare	7	F 2	Valley Falls	1,139	G 2
Jewell	593	D 2	McCune	532	G 4	Oskaloosa	721	G 2	Saint Francis	1,892	A 2	Vanner	54	D 4
Jingo	12	H 3	McDonald	426	A 2	Oswego	1,997	G 4	Saint George	251	F 2	Vassar	80	G 3
Johnson	994	A 4	McFarland	279	F 2	Otis	410	C 3	Saint John	1,735	D 3	Vermillion	283	F 2
Junction City	13,462	E 2	McLouth	477	G 2	Ottawa	10,081	G 3	Saint Joseph	28	E 2	Vernon	45	G 4
Juniata	D 3		McPherson	8,689	E 3	Ottumwa	26	G 3	Saint Marys	1,201	G 2	Vesper	100	D 2
Kackley	60	E 2	Meade	1,763	B 4	Overbrook	387	G 3	Saint Paul	783	G 4	Victor	6	D 2
Kalvesta	49	B 3	Medicine Lodge	2,288	D 4	Overland Park	10,000	H 3	Saint Peter	100	B 2	Victoria	988	C 3
Kanana	25	B 2	Medora	125	E 3	Oxford	798	E 4	Salina	26,176	E 3	Vilas	34	G 4
Kanopolis	743	D 2	Melrose	100	G 4	Ozarkie	204	G 2	Sanford	50	C 3	Vine Creek	13	E 2
Kanorado	285	A 3	Melvorn	389	G 3	Page City	100	A 2	Satanta	667	B 4	Vining	168	E 2
Kansas City	129,553	H 2	Menlo	113	B 2	Palco	405	C 2	Savonburg	155	G 4	Vinland	68	G 3
Keats	105	F 2	Mentor	44	E 3	Palmer	150	E 2	Sawyer	223	D 3	Viola	132	E 4
Kechi	160	E 4	Mercier	70	G 2	Paola	3,972	H 3	Saxman	33	D 3	Virgil	354	F 4
Keighley	21	F 4	Meriden	378	G 2	Paradise	145	D 2	Scammon	561	H 4	Villets	79	F 2
Kelly	150	F 3	Merriam	1,649	H 3	Paralle	15	F 2	Scandia	611	E 2	Voda	30	C 2
Kenhro	50	G 2	Michigan Valley	105	G 3	Park	223	B 2	Schoenchen	170	C 3	Volland	20	F 3
Kendall	125	A 4	Middletown	22	G 4	Parker	251	H 3	Scott City	3,204	B 3	Wahaussee	110	F 2
Kensington	635	C 2	Midian	50	F 4	Parkerville	78	F 3	Scottsbluff	108	D 2	Wacanda Sprs.	20	D 2
Kimball	67	G 4	Milan	165	E 4	Parsons	14,750	G 4	Sedgwick	1,640	F 4	Wakarusa	72	G 3
Kincaid	309	G 3	Milherger	40	D 3	Partridge	221	D 4	Segin	732	E 4	Wakeney	2,440	C 2
Kingman	3,200	D 4	Mildred	79	G 3	Pauline	131	G 3	Selkirk	438	B 2	Walden	591	E 2
Kingsdown	125	C 4	Milford	284	F 2	Pawnee Rock	359	D 3	Selders	100	G 3	Walker	216	D 2
Kinsley	2,479	C 4	Miller	87	F 3	Paxico	196	F 2	Selma	45	G 3	Walker	103	C 3
Kiowa	1,561	D 2	Milton	100	E 4	Peabody	1,194	E 3	Seneca	1,911	F 2	Wallace	111	A 3
Kipp	50	E 3	Miltonvale	911	E 2	Pearl	4	E 3	Severance	197	G 2	Walnut	534	G 4
Kirwin	374	C 2	Mingo	12	B 2	Peck	89	E 4	Severy	477	F 4	Walton	220	E 3
Kismet	180	B 4	Minneapolis	1,801	E 2	Penalosa	71	D 4	Seward	130	D 3	Wamego	1,869	F 2
La Crosse	1,769	C 3	Minneola	660	C 4	Pendennis	10	B 3	Shady Bend	25	D 2	Washington	1,627	E 2
La Cygne	794	H 3	Misson	13,000	H 2	Penokee	90	C 2	Shaffer	15	C 3	Waterloo	45	E 4
La Harpe	511	G 4	Mission Hills	1,275	*H 2	Peoria	40	G 3	Shallow Water	105	B 3	Waterville	676	F 2
Lahette	145	G 4	Mission Woods	205	*H 2	Perry	399	G 2	Sharon	278	D 4	Watson	707	H 2
Lafontaine	125	G 4	Mitchell	85	D 3	Perth	75	E 4	Sharon Sprs.	994	A 3	Wayne	75	F 4
Lake City	1,618	A 4	Modoc	56	A 4	Peru	368	F 4	Sharpe	31	G 3	Wayne	60	E 2
Lakin	100	E 2	Moline	871	F 4	Petrolia	125	G 4	Shaw	35	G 4	Wayne	90	G 4
Lamar	200	G 3	Monrovia	20	G 2	Pfeifer	156	C 3	Shawnee	845	H 3	Webber	96	D 2
Lamont	200	G 2	Mont Ida	50	G 2	Phillipsburg	2,589	C 2	Shawnee	100	H 4	Webster	130	C 2
Lancaster	200	G 2	Montezuma	509	B 4	Piedmont	130	F 4	Shields	75	B 3	Weir	819	H 4
Lane	128	D 4	Monument	106	D 2	Pilsen	175	B 4	Silica	10	D 3	Welhorn	3,425	H 2
Langdon	75	D 3	Monument	160	A 2	Piqua	52	E 3	Silver Lake	331	G 2	Welda	214	G 4
Lansing	1,100	H 2	Moran	616	G 4	Pittsburg	19,341	H 4	Silverdale	150	F 4	Wellington	7,747	F 4
Larkinburg	99	G 2	Morehead	70	G 4	Plains	718	B 4	Simpson	234	E 2	Wells	75	E 2
Larned	4,447	C 3	Morganville	278	B 2	Plainville	2,082	C 2	Sitka	150	C 4	Wellsford	59	C 4
Latham	218	F 4	Morrill	362	G 2	Pleasanton	1,178	H 3	Skiddy	70	F 3	Wellsville	729	G 3
Latimer	34	F 3	Morrowville	229	E 2	Plevna	200	D 4	Smith Center	2,026	D 2	Weskan	200	A 3
Lawrence	23,351	G 3	Morse	80	H 3	Plymouth	80	F 3	Smolan	193	G 2	West Mineral	349	H 4
Lawton	85	H 4	Moscow	222	A 4	Pomona	453	G 3	Soldier	193	G 2	West Plains	67	H 4
Le Loup	110	G 3	Mound City	707	H 3	Porter	286	D 2	Solomon	834	E 3	(Plains)	718	B 4
Le Roy	695	G 3	Mound Valley	566	G 4	Portis	120	G 2	Solomon Rapids	10	D 2	Westfall	715	D 3
Leavenworth	20,579	H 2	Moundridge	942	E 4	Pottaw	465	F 4	South Haven	358	E 4	Westmoreland	416	F 2
Leawood	1,167	H 3	Mound Hope	473	E 4	Powhattan	150	G 2	S. Hutchinson	1,045	D 3	Westphalia	254	G 3
Lebanon	610	D 2	Mulberry	779	H 4	Prairie View	192	C 2	South Mound	50	G 4	Westwood	1,581	H 2
Lehigh	575	G 2	Mulvane	1,387	H 2	Prescott	283	H 3	Sparks	129	G 2	Westwood Hills	431	H 2
Lenexa	803	*H 3	Muncie	60	H 2	Freston	307	D 4	Spearville	610	C 4	Wetmore	397	G 2
Lenora	518	F 4	Munden	169	E 2	Frederick Prairie	484	D 4	Speed	70	C 2	Wheaton	134	F 2
Leon	130	G 2	Munier	150	C 3	Franklin	177	G 3	Spivey	109	D 4	Wheeler	35	A 2
Leonardville	320	F 2	Murdoch	120	E 4	Protection	814	C 4	Spring Hill	619	H 3	White City	540	F 3
Leoti	1,250	A 3	Muscotah	248	G 2	Purcell	50	G 2	Stafford	2,005	D 4	White Cloud	308	G 2
Leoville	100	B 2	Narka	220	E 2	Quincy	391	G 3	Stanley	300	H 3	Whitewater	453	E 4
Levant	130	A 2	Nashville	159	D 4	Quinter	741	B 2	Stark	157	G 4	Whiting	267	G 2
Lewis	475	C 4	Natoma	775	D 2	Radium	64	D 3	Stearling	2,243	D 3	Wichita	168,279	E 4
Liberal	7,134	B 4	Navarro	80	E 4	Rag	100	D 4	Stellwell	209	H 3	Wilburton	22	A 4
Liherty	185	G 4	Neal	102	F 3	Ramona	190	E 3	Stockdale	80	F 2	Willard	95	G 2
Liebertal	211	C 3	Nekoma	96	C 3	Randall	240	D 2	Strawberry	1,867	E 2	Williamsburg	297	G 3
Lillis	50	F 2	Neodesha	3,723	G 4	Randolpb	391	F 2	Strawn	150	G 3	Williamstown	140	G 2
Lincoln	1,650	D 3	Neola	15	D 4	Rantoul	405	C 3	Strong City	680	F 3	Willis	172	C 4
Lincolnton	228	F 3	Neosho Falls	355	G 3	Raymond	197	G 3	Studley	73	B 2	Wilmore	25	F 4
Lindsborg	2,383	E 3	Neosho Rapids	204	F 2	Reading	275	D 3	Stull	101	G 3	Wilson	251	F 3
Linn	395	E 2	Ness City	1,612	C 2	Reagan	289	F 2	Stuttgart	100	C 2	Winchester	1,039	D 3
Linwood	261	G 2	Ness City	213	G 2	Reamsville	10	B 2	Suhlette	838	B 4	Winfield	355	G 2
Little River	635	E 3	New Albany	152	G 4	Redfield	173	H 4	Summerfield	305	F 2	Windom	193	E 3
Logan	859	C 2	New Alamo	78	B 2	Redwing	50	D 3	Sun City	231	D 4	Winfield	10,264	F 4
Lora Elm	82	G 3	New Cambria	160	E 3	Reece	250	F 4	Sundowner	3,834	G 3	Winifred	53	F 2
Lone Star	50	G 2	New Lancaster	15	H 3	Reno	50	G 2	Susank	100	D 3	Winkler	6	F 2
Long Island	247	C 2	New Salem	63	F 4	Republi	360	E 2	Sycamore	350	G 4	Winona	382	A 4
Longford	178	E 2	Newton	11,590	E 3	Reserve	169	G 2	Sylvan Grove	506	D 2	Wolcott	2	H 2
Longton	478	F 4	Nickerson	1,013	D 3	Rest	10	G 4	Sylvia	490	F 2	Wright	2	H 3
Loretta	30	C 3	Nicodemus	100	E 2	Rexford	304	B 2	Syracuse	2,075	E 3	Wymore	15	D 2
Lorraine	195	D 3	Niles	162	F 4	Rice	27	E 2	Talmo	250	E 2	Woodbine	195	E 3
Lost Springs	184	E 3	Nitaze	368	B 2	Richfield	105	A 4	Tampa	216	E 3	Woodruff	46	C 2
Louisburg	677	H 3	Noratur	60	D 2	Richland	141	G 3	Tasco	16	B 2	Woodstock	296	C 2
Louisville	190	F 2	North Norton	566	C 3	Richmond	433	G 3	Tecumseh	200	G 2	Worford	50	G 3
Lovewell	76	D 2	Northbranch	60	D 2	Richter	25	C 3	Tescott	412	E 2	Wright	350	C 4
Lucerne	631	D 2	Norton	3,060	C 2	Riga	21	C 3	Tetterville	100	F 3	Xenia	24	G 4
Ludell	120	B 2	Nortonville	568	G 2	Riley	414	F 2	Thayer	423	G 4	Yates Center	2,178	G 4
Luray	351	D 2	Norway	100	E 2	Riverdale	65	E 4	Thornburg	1	D 2	Yocemento	100	E 4
Lyle	2	B 2	Norwich	378	E 4	Riverton	250	H 4	Timken	38	F 3	Zander	40	F 2
Lyndon	729	G 3	Nyo	60	G 4	Robinson	381	G 2	Tipton	138	C 3	Zandale	226	F 4
Lyons	4,545	D 3	Oak Valley	92	E 2	Rock	124	F 4	Tonganoxie	1,138	G 2	Zenith	100	D 4
Macksville	624	D 4	Oakhill	1,915	B 2	Rock Creek	100	G 2	TOPEKA	78,791	G 2	Zimmerdale	25	E 3
Mackson	1,212	F 3	Ober											

WHERE KANSAS MAKES ITS LAWS

Near Garden City, in far western Kansas where rainfall is relatively light, a vast sheet of underground water makes irrigation possible. Here sugar beets are grown. Broomcorn is a major crop in the southwestern counties. Other important Kansas crops are sorghums, hay, barley, soybeans, flaxseed, apples, truck crops, alfalfa seed, and potatoes.

In most years Kansas is surpassed only by Texas and Iowa in the production of cattle. Cattle are raised in two main grazing sections, the region of bluestem grass in east-central Kansas and a short-grass section in west Kansas. The animals are fattened on corn grown in northeast Kansas and are marketed in Kansas City.

"Crops" That Underlie the Farms

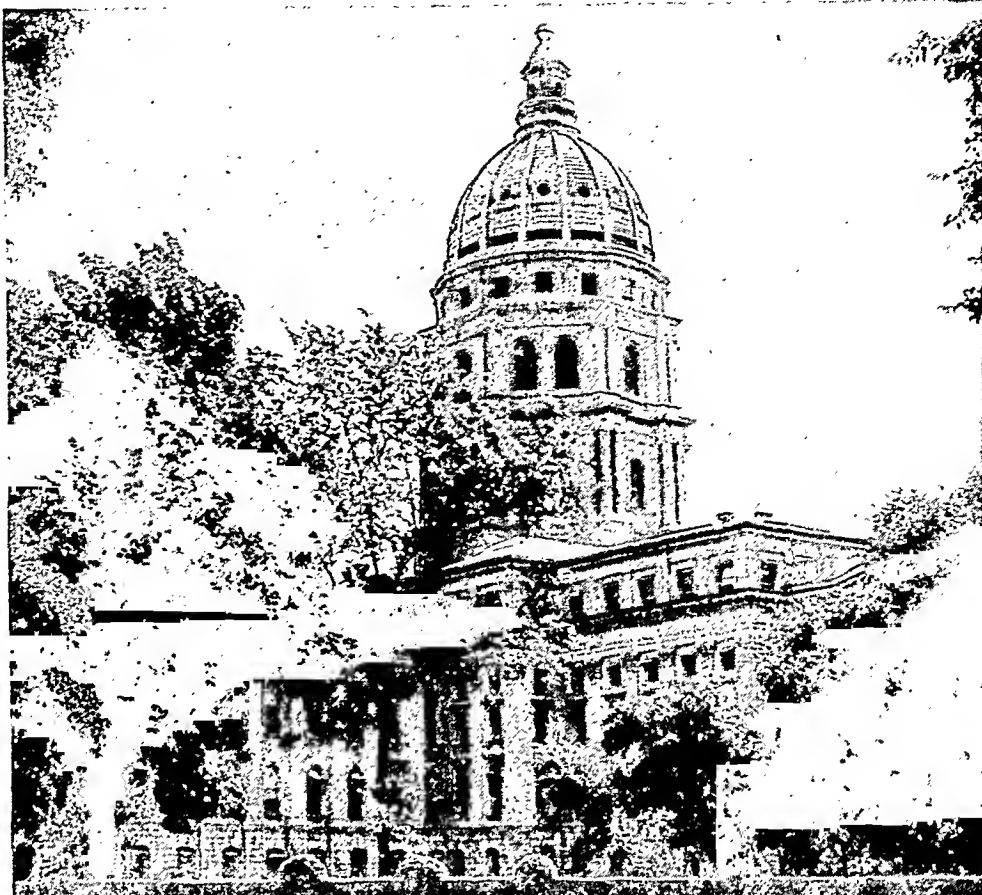
The chief minerals are petroleum, cement, natural gas, natural-gas liquids, zinc, stone, and coal. The main coal region is in the southeast corner of the state, centering around Pittsburg. Miami, Allen, Wilson, and Montgomery counties saw the earliest development of petroleum and natural gas. Petroleum has since been found in most parts of Kansas. Oil derricks have risen on prairies and on farms. In Wichita they invaded the residential sections. The richest fields today are in the central and western sections of the state.

Kansas is among the leading states in the production of zinc and salt. Gypsum, pumice and pumicite, lead, helium, and clays are other mineral products of some importance. Much of the sand and gravel obtained in the state is used in the construction of roads.

Manufacturing in the Cities

This important agricultural state also has some notable manufacturing industries. Largest is the processing of food, including flour and meal, packed meat, and bakery and dairy products. Other large state industries are the manufacture of chemicals and transportation equipment and the refining of petroleum.

There are few large cities. Wichita, first in the state in size and manufacturing, is a city of flour mills, grain elevators, oil refineries, stockyards, and many factories. It is one of the great airplane production centers of the world (see Wichita).



The State Capitol at Topeka stands in the center of a quiet landscaped square. The four wings of the building extend in the form of a Greek cross topped by a dome 304 feet above the street. The Senate meets in the east wing, the House of Representatives in the west wing.

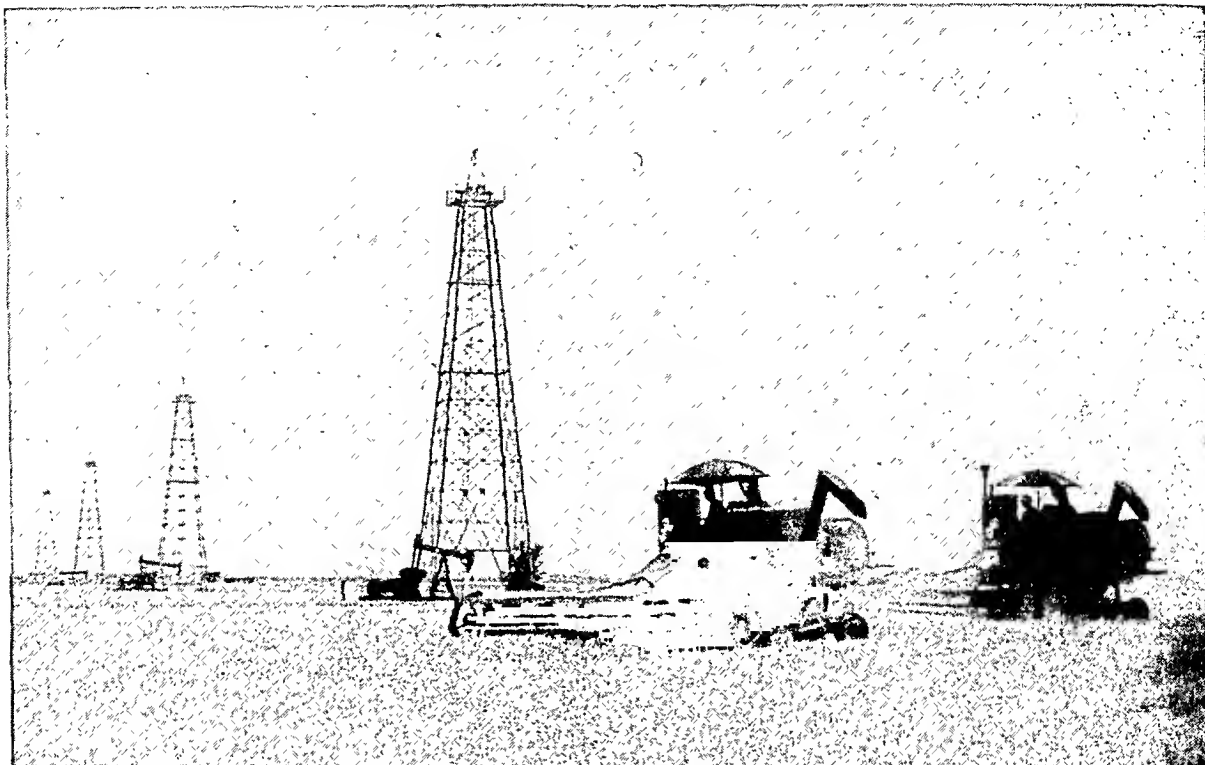
Kansas City, second largest city, is a meat-packing center with many industries (see Kansas City, Kan.). Topeka, the capital city, has meat-packing plants and railroad shops (see Topeka). Hutchinson's industries are based on wheat, salt, and oil. Salina mills flour. Lawrence is an educational, industrial, and farm center. At Leavenworth, a manufacturing and shipping center, are an army post and penitentiaries. Pittsburg is in Kansas' chief coal-mining area.

History of the "Sunflower State"

In 1541 Coronado and his party of Spanish explorers crossed the region—the first white men to see Kansas. Most of the land was acquired by the United States through the Louisiana Purchase of 1803. Prairie schooners crossed the Indian land of Kansas on their westward journeys to Santa Fe during the 1820's and to Oregon and California in the 1840's.

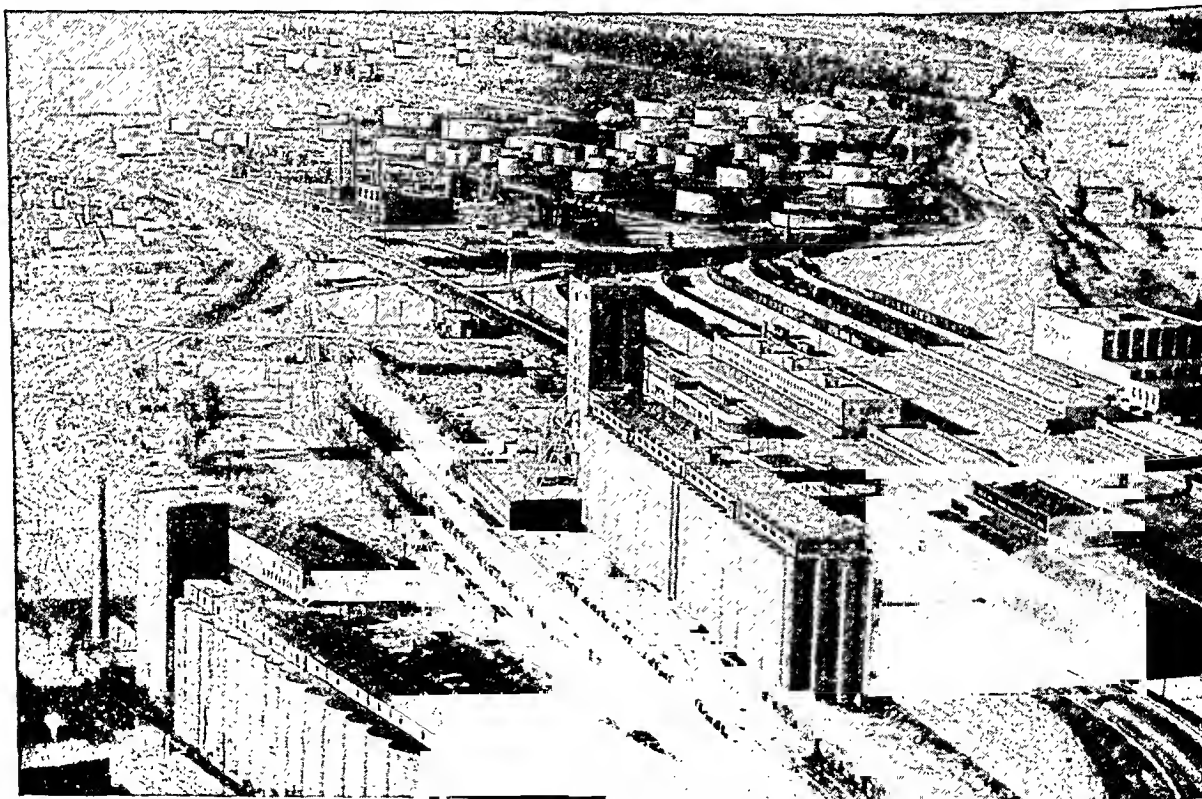
After 1854 proslavery and antislavery groups quarreled over whether the territory was to become a free or a slave state (see Kansas-Nebraska Act). Their fierce battles gave rise to the expression "bleeding Kansas." In 1859 a convention at Wyandotte (later Kansas City) adopted an antislavery constitution. It was ratified by popular vote. In 1861 Congress admitted Kansas to the Union as a free state, with Topeka as the capital. In 1933 Kansas became the first state to create a fact-finding legislative council.

WEALTH FROM THE LAND—OIL AND WHEAT



The oil derricks may seem strange in this field of wheat but this is a common sight in Kansas. Oil and wheat are the state's leading sources of mineral and agricultural income. The flat

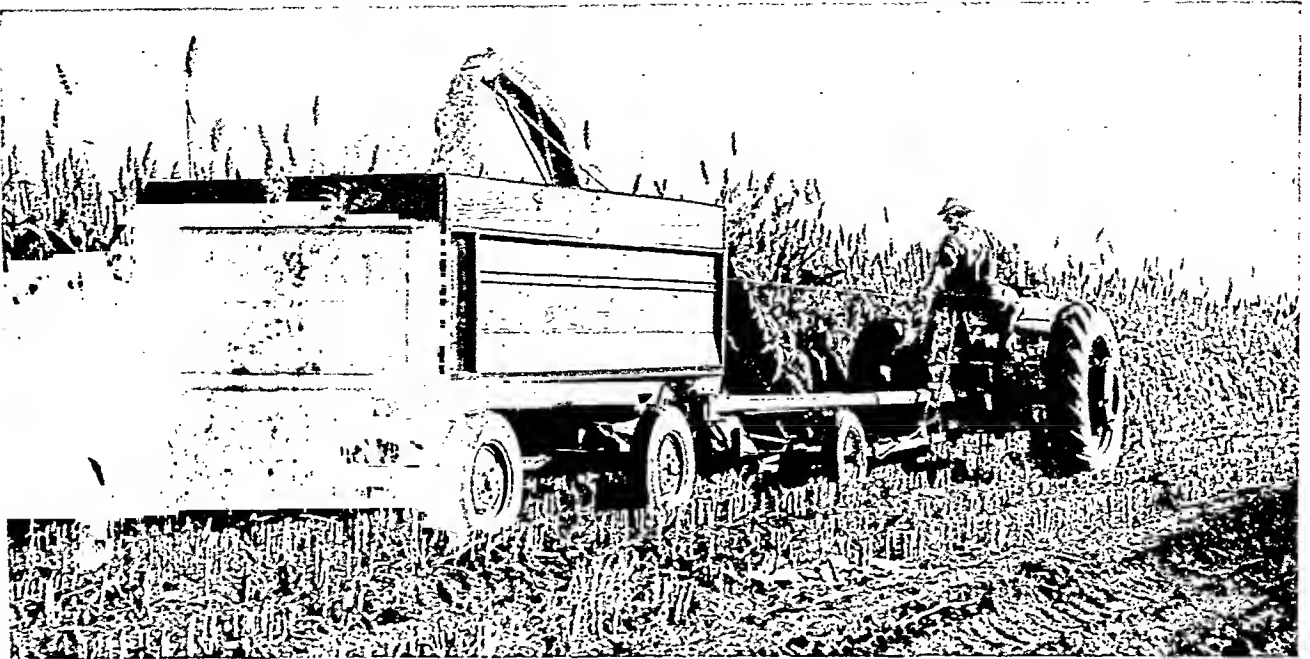
land is ideal for large-scale wheat growing with machinery. Kansas is one of the most mechanized farm sections of the world. The combines operate at night with powerful lights.



This view of the river-and-rail terminal at Kansas City, Kan., again tells us that the chief products of Kansas are oil and wheat. A refinery and storage tanks for processing Kansas'

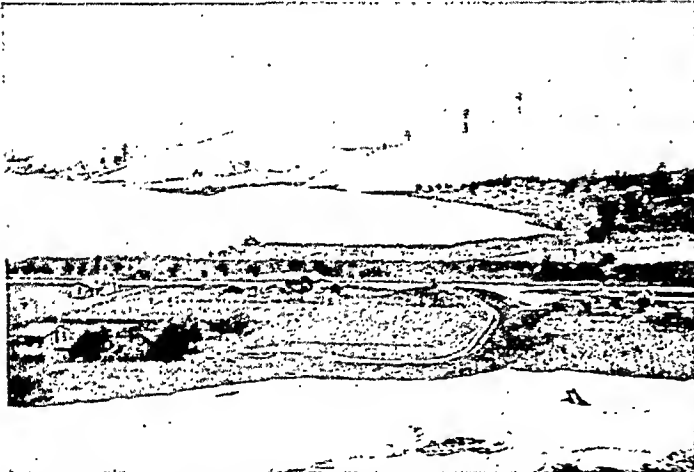
buried wealth stand in the background at the bend of the Kansas River. Tall grain elevators for storing wheat from the fields of the "nation's breadbasket" tower in the foreground.

KANSANS AT WORK AND AT SCHOOL

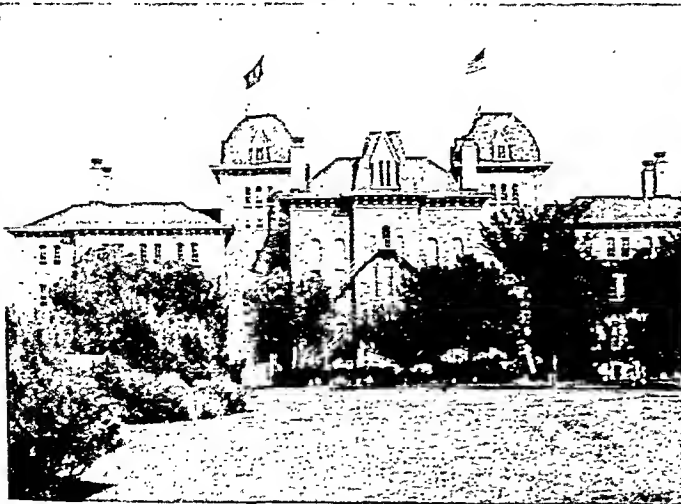


The farmer is harvesting his fine crop of sorghum. The tractor-driven machine cuts off the stalks, chops them up for silage,

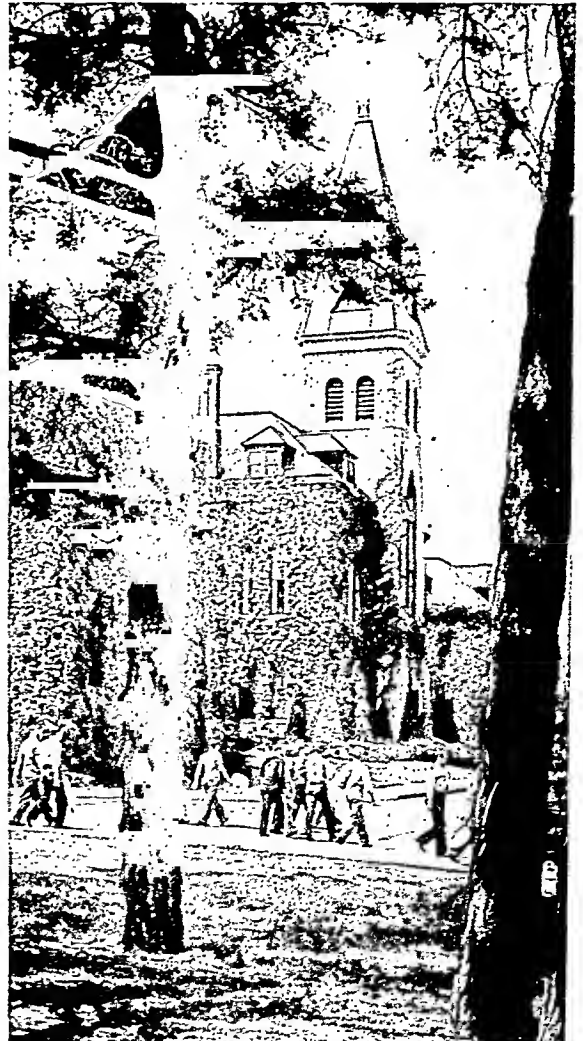
and dumps them into the wagon. Sorghum makes excellent animal feed. Kansas ranks next to Texas in sorghum production.



Lead and zinc mining has left huge piles of waste called "chat" beside a highway. The road forms the Kansas-Oklahoma boundary here.



The oldest building on the campus of the University of Kansas, the state university at Lawrence, is Fraser Hall. It was completed in 1872.

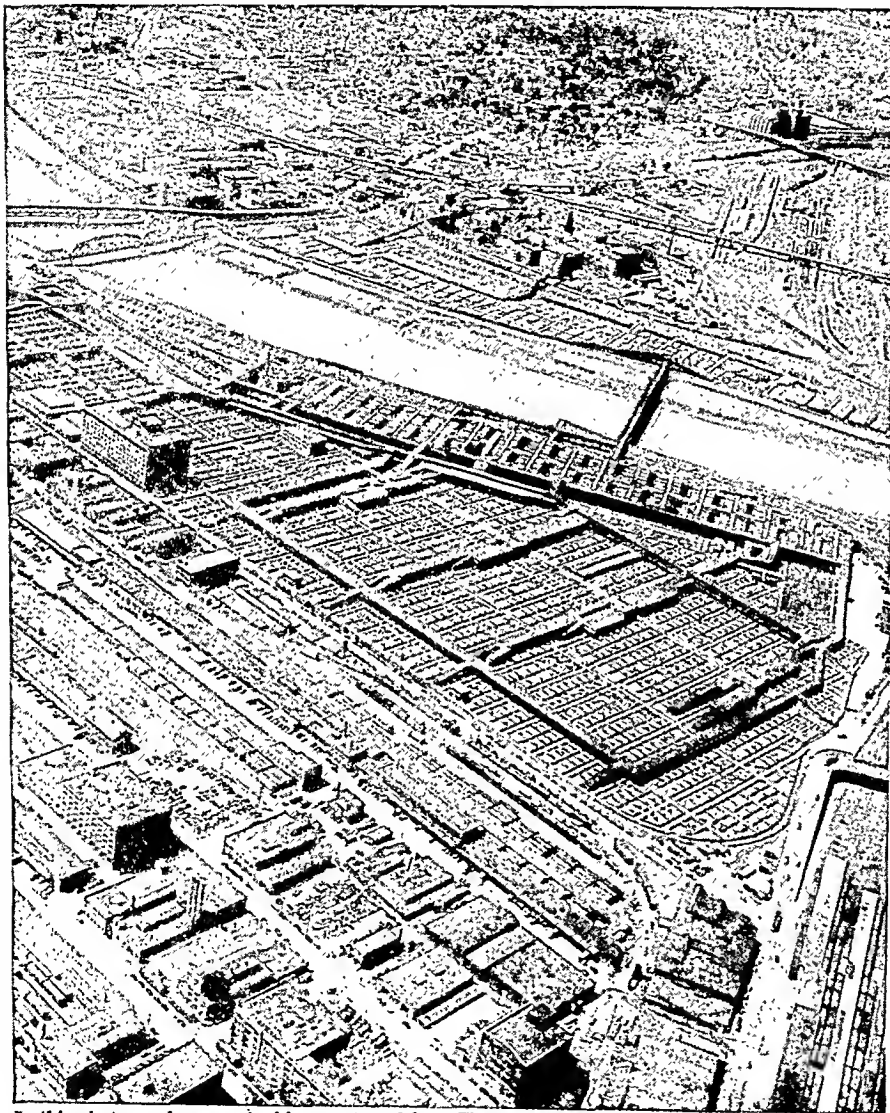


This is the tower of Anderson Hall of Kansas State College of Agriculture and Applied Science at Manhattan.

Kansas has frequently adopted laws which were unusual or ahead of the times. In 1880 the voters ratified a prohibition amendment to the state constitution—the first state to do so. This amendment was repealed in 1948, effective in 1949. Women received the right to vote and hold office in city governments in 1887 and full suffrage in 1912. An antitrust law was enacted in 1889, and a “blue sky” law to regulate the sale of securities in 1911. (See also chronology in Kansas Fact Summary; United States, sections “North Central Plains” and “Great Plains.”)

the most part, by the same union railway terminal. The Kansas metropolis lies on both sides of the Kansas River, to the west of Kansas City, Mo., rising in the west to bluffs and hills upon which much of the residence portion of the city is built. The bottom lands in the river valley are the seat of many great industries and factories, chief of which are the slaughtering and meat-packing establishments. Owing to their position among the corn and beef states of the southwest, the two Kansas Cities together rank as the second live stock market in the United States.

THE TWIN CITIES ON THE KANSAS RIVER



In this photograph we are looking westward from Kansas City, Mo., toward the industrial area of Kansas City, Kan., along the Kansas River. On both sides of the river are the great stockyards, second largest in the world. Connected by bridges and railroad tracks, the yards work together as a unit. They are capable of handling 70,000 cattle, 50,000 hogs, and 50,000 sheep daily.

KANSAS CITY, KAN. Only the state line divides the second largest city of Kansas from its twin city on the Missouri side. The two cities are one industrially and commercially and are served by the same bus system, the same telephone exchange, and, for

They also make shortening, soap, and many other important by-products of the meat-packing industry.

The advantages of natural gas and oil, combined with excellent railway facilities, have helped greatly in building up the industries of Kansas City, Kan. In addition to its stockyards it has large flour mills and grain elevators, oil refineries, iron and steel works, foundries, and lumber and brick yards. Fairfax airport is one mile from the city's center. In the business district, adjoining Huron Park, a Wyandotte Indian cemetery is still preserved. These Indians were the original settlers of the district. In 1886 a number of small towns combined to form Kansas City, taking the name from the Missouri city. In 1951 Kansas City suffered the worst flood in its history. The city is governed by a commission. Population (1950 census), 129,553.

KANSAS CITY, Mo. Missouri's second largest city is the market place and manufacturing center for a vast area of the West and Southwest. It lies on the western boundary of the state, at the point where the Kansas River enters the Missouri River.

Here the winding Missouri leaves the state border, checks its southward course, and turns sharply eastward. This location has been a natural trading center for more than a hundred years. Fur trappers along both rivers brought their pelts to the bend where Francois Chouteau established a trading post in 1821.

Westport Landing grew up nearby. At this transfer point, settlers coming upstream by boat outfitted their wagons for the long journey to the Far West over either the Santa Fe or the Oregon Trail. At first, Independence, ten miles to the east, was the main outfitting center. But the great Missouri flood of 1844 destroyed the Independence wharves, and Westport Landing gained most of the Santa Fe trade. In 1853 Westport Landing was renamed City of Kansas, and in 1889 it became Kansas City.

Kansas City's industries have developed out of the rich agricultural lands which surround it. Lying between the range country of the West, where cattle are raised in great numbers, and the corn-belt states, where they are fattened, it became a big livestock market. Together with its twin city across the state line in Kansas, it forms a meat-packing center second only to Chicago (*see* Kansas City, Kan.). Important by-products of the meat-packing industry include soap, gelatin, oleomargarine, and leather goods. It is the world's largest winter-wheat market. With Kansas City, Kan., it is second only to Buffalo in flour milling. Other large industries include bakery products, garmentmaking, automobile assembling, petroleum refining, and the manufacture of iron and steel, cereals, and livestock feeds.

Kansas City is situated on bluffs which rise in terraces above the river bottoms. A 40-million-dollar boulevard system links the various sections of the city. Cliff Drive, winding for several miles along the Missouri, commands a wide view of the river valley. On the west side of the city is the Municipal Auditorium. Its Music Hall is the home of the Kansas City Philharmonic Orchestra. The Union Station is one of the largest railway stations in the country. Facing it across a plaza stands the impressive Liberty Memorial, a shaft of limestone 217 feet high.

The William Rockhill Nelson Gallery of Art and the Mary Atkins Museum of Fine Arts occupy a beautiful classic building on the site of the Nelson home. They were endowed by the journalist W. R. Nelson, founder of the *Kansas City Star*, and Mrs. Mary Atkins. Nearby is the Art Institute. Thomas Hart Benton was long a member of its faculty, and one of its most famous students was Walt Disney, creator of the Mickey Mouse cartoons. To the south across Brush Creek Valley and a stretch of wooded land, is the University of Kansas City.

The city-manager form of government was adopted in 1925. In July 1951 Kansas City suffered the worst flood in its history from the overflowing Kansas (Kaw) and Missouri rivers. Population (1950 census), 456,622.

KANSAS-NEBRASKA ACT. The Kansas-Nebraska Act, passed by Congress in 1854, has been pronounced the most momentous piece of legislation in the United States before the Civil War. It set in motion events which led directly to the conflict over slavery.

In January 1854, with the support of President Franklin Pierce, Senator Stephen A. Douglas of Illinois laid before the Senate a report of the Committee

on Territories which provided for the organization of the territories of Kansas and Nebraska. The bill allowed the people of these regions to decide for themselves whether they would allow slavery within their borders. Douglas called this proviso "popular sovereignty"; opponents of the bill called it "squatter sovereignty." The bill as finally enacted into a law expressly repealed the Missouri Compromise, which had prohibited slavery north of latitude 36° 30'—a compact which for a whole generation had been regarded as a binding agreement between the people of the North and the South.

The news that such an act was contemplated fell like a thunderbolt upon the people of the North. Mass meetings were held to denounce the measure. Ministers preached against the "Nebraska iniquity," and Douglas was accused of weakly yielding to the South in the hope of winning the presidency.

In spite of Northern anger, Congress passed the bill on May 30, 1854. The fight over slavery was then transferred to the two territories. Proslavery men of the South and antislavery men of the North rushed into Kansas, each side determined to win the state. The first elections, in 1855, were carried by the settlers from the South, aided by the "border ruffians" of Missouri. They crossed the border the night before election and seized the polls, illegally casting their votes for a proslavery candidate for governor.

The settlers from the North refused to abide by the result of this fraudulent election. They held one of their own, at which the proslavery men refused to vote. As a result two rival governments were set up in the territory, and a veritable civil war ensued, in which the antislavery party under the leadership of John Brown retaliated with violence to the violence of the proslavery men. The attention of the whole country was fixed on "bleeding Kansas."

The settlers from the South were supported by President Pierce. Eventually he sent United States troops into the territory to quell the disturbance and to disperse the free-state legislature. A new election was then called, and again the illegal methods of the proslavery party won the day. But Congress refused to recognize as legal the constitution adopted by such methods, and Kansas was forced to remain a territory a while longer.

As time went on, the free-state settlers became more numerous, and finally the South gave up the attempt to make Kansas a slave state. A new constitution was then drawn up, and on Jan. 29, 1861, on the eve of the Civil War, Kansas was admitted to the Union as a free state. (*See also* Kansas.)

KAPOK (*kā'pōk*). From the branches of the ceiba tree dangle pods filled with silky fibers called kapok. These fibers are fine, air-filled tubes, valuable for making mattresses, upholstery, lifesaving equipment, and insulation. In life preservers kapok supports 30 times its own weight and is seven times more buoyant than cork. Fiberglass, foam rubber, and other substitutes are replacing kapok in some uses. Highly

inflammable, kapok can be rendered reasonably fire-proof by a simple chemical treatment.

The ceiba tree grows in all tropical and semitropical climates but thrives best at altitudes of less than a thousand feet and on porous volcanic soil. It grows very straight for 30 to 40 feet, with its few limbs sticking out horizontally.

Most kapok comes from Indonesia, chiefly Java. Other Asiatic producers are Indo-China, the Philippines, Ceylon, India, Burma, and Malaya. Producers in Latin America include Brazil, Ecuador, and the Dominican Republic. Less than 10 per cent is grown on the plantations. The remainder is gathered from wild trees.

Seedlings send down a long taproot. In three to six years they are producing. In September, when the pods begin bursting, the fiber is pulled out and taken to market. Here it is cleaned, sorted, and baled for export. A mature tree yields about 7,000 pods, or 60 pounds of cleaned floss; also about 135 pounds of seeds.

The seeds furnish oil for soap. The down of milkweed can serve as a substitute for kapok (see Milkweed).

KASHMIR. The state of Kashmir occupies the northernmost part of the peninsula of India. Much of it is wild, uninhabited country. Great mountain ranges sweep across it from east to west. The highest range is the Karakoram, in the northeast—probably the iciest range outside the polar regions. Within it rises the peak Godwin-Austen, or K-2 (28,250 feet), the second highest mountain in the world. A few high narrow passes lead northeast to Chinese Sinkiang and west to Afghanistan. No passes pierce the mountain mass that separates Kashmir from Russia at the north.

"The House of Many Stories"

From towering ranges in the north the land slopes southward in a series of steps. The first step is to the valley of the Indus River, which separates the northern ranges from the Himalayas. The second step is to the valley of the Jhelum. The third is to the basin of the Chenab River, in the semimountainous Jammu section of Kashmir. All these rivers cut through the mountains from east to west, then turn southwestward into the plain of the Punjab, which borders Kashmir on the south.

Near the center of Kashmir the Jhelum River winds through the beautiful Vale of Kashmir, celebrated

in song and story. The Vale is an oval basin, 84 miles long and 20 to 25 miles wide, once the bed of a vast lake. Glorious snow-capped peaks look down on this "happy valley," where roses bloom and fruit trees thrive. Loveliest of all its gardens is Shalimar, a royal pleasure ground on lotus-covered Dal Lake. Magnificent scenery and a cool, healthful climate have made the Vale a popular summer resort.

The chief cities (1941 census) are Srinagar (207,787), summer capital, on the Jhelum; and Jammu (50,379), winter capital, on a tributary of the Chenab. Roads link these cities with the railways of the Punjab.

Kashmir is one of the most backward states of the Indian peninsula. A small ruling class of Hindus has fabulous wealth. The Moslems (Mohammedans), who make up the bulk of the population, live in wretched poverty and ignorance. They are handsome people, well proportioned and fair skinned. Although poor, they contrive to look very attractive in their simple clothes of many colors. They have long been noted for their art and handicrafts—silk fabrics, woolen textiles (particularly the famous Cashmere shawls and carpets), papier-mâché articles, wood carving, and silverware. The people subsist mainly on rice, which they grow in irrigated fields.

Pakistan Lays Claim to Kashmir

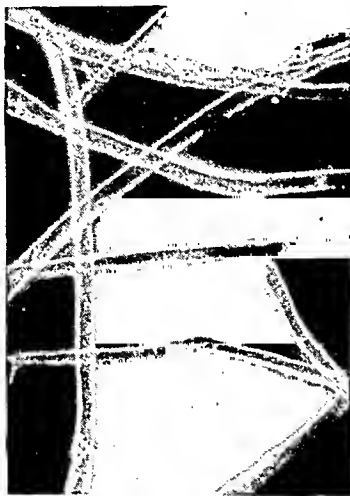
Owing to its mountain seclusion, a little out of the path of the many invaders that swept India from the northwest, Kashmir experienced few political changes until modern times.

In 1586 Akbar brought Kashmir into the great Mogul empire (see India). The Afghans conquered it in 1756 and held it until 1819, when it fell to the Sikhs of the Punjab. In 1846 the British took it under their protection and established a princely Hindu family of Jammu, the Singhs, on the throne. Kashmir and Jammu were thus united.

When the Indian Empire was dissolved (Aug. 15, 1947), Kashmir, as a princely state, was granted independence. Pakistan, the new Moslem nation, at once laid claim to it. In October, 10,000 fanatic Moslem tribesmen invaded Kashmir from Pakistan. Fearing he would lose his throne, the Hindu Maharajah of Kashmir announced that it would join Hindu India and called for aid. India moved in troops and an undeclared war broke out. The United Nations sent a commission to investigate. On Jan. 1, 1949, India and Pakistan ordered a cease-fire. Both agreed to a plebiscite conducted by a United Nations administrator; but the plebiscite was delayed. In 1952 the constituent assembly abolished hereditary rulership and elected a head of state. Area, with Jammu, 84,516 square miles; population (1951 estimate), 4,410,000.

KATYDID. Throughout the late summer nights the katydid sings unceasingly in the tops of the tallest trees, "*Katy did; Katy didn't; she did; she didn't.*" It is one of the most musical of our insect songsters. Less famous but more numerous than the oval-winged or true katydid is the angular-winged katydid that sings merely, "*Tic*" and "*Tzeet.*" These two katydids, however, are very similar in life histories and habits.

KAPOK FIBERS



This photograph clearly shows kapok fibers as air-filled tubes. The fibers are magnified 110 times.

Only the male katydids are the music makers, and the song they sing is the mating call. They make the sound by rubbing a scraper at the base of one of the front wings across a file on the base of the other. The sound will often carry a quarter of a mile on a still summer night.

Katydids are green and blend with the leaves where they live. Like their cousins the grasshoppers they are good jumpers. The two antennae or feelers upon the head are long and fragile. The body is rather broad and boatshaped. The wing covers are delicate and thin, not heavy like the grasshopper's front wings. From head to tip of folded wings, a full grown katydid is one and one half to about two inches long. The insects feed upon leaves and tender twigs, but they are not especially harmful to vegetation.

Early in autumn katydids lay some 200 or more flattened, slate-colored eggs. These are about one-eighth of an inch long and one-third as wide. The eggs are laid in overlapping rows on twigs, leaves, and edges of fence boards. The female secretes a glue for gumming the eggs in place. The following spring, each egg splits along the top, and the young "katys" squirm out. At first they are very pale in color, but they soon assume the leaf-green tints of the adults. In the South, where the summer season is long, there are usually two broods a year; in the North there is only one. Katydids live but a season. The mature insects die with the frosts of autumn.

Katydids belong to the order *Orthoptera*, which also includes grasshoppers, crickets, and cockroaches. Scientific name of oval-winged or true katydid, *Pterophylla camellifolia*; of angular-winged katydid, *Microcentrum retinervis*. Both species are found east of the Rocky Mountains.

KEATS, JOHN (1795-1821). "Here lies one whose name was writ in water." This is the epitaph which the poet John Keats prepared for himself. He conceived it in the melancholy days when he felt his death approaching and despaired of winning the fame for which he longed. True, his whole poetical career had lasted only seven years, but during this brief period he had written some of the greatest poems in the English language, crowded with lines of exquisite and haunting beauty that will live as long as the language is spoken.

John Keats was the son of a livery-stable keeper. He passed his early years, not close to nature as did most of our poets, but in the city of London, and yet in some marvelous manner there was born in him an intense love of beauty. "A thing of beauty is a joy forever" is the first line of his 'Endymion', and in his 'Ode on a Grecian Urn', in which he seems indeed to have caught much of the ancient Greeks' worship of beauty, he declares:

Beauty is truth, truth beauty,—that is all
Ye know on earth, and all ye need to know.

Unlike his contemporaries Shelley and Wordsworth, Keats had no desire to reform the world or to teach a lesson. He was content if by his magic power he could make us see and hear and feel with our own senses those marvelous forms and colors and sounds that his imagination brought forth.

In what is perhaps the richest of all his poems—"The Eve of St. Agnes"—he even makes us taste the—

. . . jellies soother than the
creamy curd,
And lucent syrops, tinct with cin-
namon.

Keats was apprenticed to a surgeon in early youth and studied surgery faithfully for seven years, but his heart was elsewhere. "I find I cannot exist without Poetry," he said, "—without Eternal Poetry." In 1816 he became acquainted with Leigh Hunt, and through Hunt with Shelley. In the following year at 22 he gave up his profession and devoted the rest of his short life entirely to the writing of poetry.

In 1818 his first long poem, 'Endymion', appeared. It was bitterly and harshly attacked by the reviewers, who overlooked its beauties and failed to see that its faults were due to immaturity. Other troubles crowded upon the young poet. He was in money difficulties, and he was tormented by a hopeless love affair. His health had begun to fail and he rapidly developed tubercu-

losis. In the autumn of 1820 he went to Italy and early in the following year he died at Rome.

Keats's chief poems are: 'Endymion'; 'Lines on the Mermaid Tavern'; 'Isabella, or The Pot of Basil'; 'I Stood Tiptoe upon a Little Hill'; 'The Eve of St. Agnes'; 'La Belle Dame Sans Merci'; 'Ode to a Nightingale'; 'Ode to Autumn'; 'Lamia'; 'Hyperion'; and a number of sonnets, among which are 'On First Looking into Chapman's Homer', and 'When I Have Fears That I May Cease to Be'. All were published between 1817 and 1820.

HOW A KATYDID LAYS HER EGGS



Here we see how an angular-winged katydid shingles a twig with her eggs. She cements them so firmly that they remain until they hatch six or seven months later. This picture is larger than life-size.

KELLER, HELEN ADAMS (born 1880). "Once I knew only darkness and stillness. . . My life was without past or future. . . But a little word from the fingers of another fell into my hand that clutched at emptiness, and my heart leaped to the rapture of living."

This is how Helen Keller described the beginning of her "new life," when despite blindness and deafness she learned to communicate with others.

She was born June 27, 1880, at Tuscumbia, Ala. Nineteen months later she had a severe illness which left her blind and deaf. She also lost the power of speech. But her parents had hope for her. They had read Charles Dickens' report of the aid given to another blind and deaf girl, Laura Bridgman. When Helen was six years old, her parents took her to Alexander Graham Bell

(see Bell, Alexander). As a result, Anne Mansfield Sullivan (who became Mrs. John Albert Macy in 1905) began to teach Helen Keller on March 3, 1887. For almost 50 years—until her death in 1936—she remained Helen's teacher and constant companion. Miss Sullivan herself had been almost blind in early life, but her sight had been partially restored.

Both teacher and pupil were remarkably gifted. Helen soon learned the finger-tip, or manual, alphabet as well as braille. By placing her sensitive fingers on the lips and throat of her teachers, she learned to "hear" them speak. Three years after mastering the manual alphabet, she learned to speak herself. She also learned to typewrite.

At the age of 20 she was able to enter Radcliffe College, where she received her Bachelor of Arts degree in 1904 with honors. She used textbooks in braille, and Miss Sullivan attended classes with her and spelled the lectures into her hand.

After graduation Miss Keller helped to found the Massachusetts Commission for the Blind. She served on the commission and later helped in the work to prevent blindness in new-born children. In 1931 she helped raise \$1,000,000 for the American Foundation for the Blind. She traveled widely and became well known as a writer and a lecturer. Her writing is colorful and poetic; it reveals keen interest in the beauty of things too often taken for granted by those who can see and hear.

Working at her home near Westport, Conn., she devoted her life to helping the unfortunate, especially the blind and deaf. (See Blind, Education of.)

Miss Keller has told her experiences in several books, including, 'The Story of My Life' (1903); 'Optimism' (1903); 'The World I Live In' (1908); 'Out of the Dark' (1913); 'Midstream: My Later Life' (1929); 'Journal' (1938); 'Let Us Have Faith' (1940).

HELEN KELLER "SEES" THE PRESIDENT



Her sensitive fingers, the only source of her impressions, let Miss Keller get acquainted with the Eisenhower smile.

KENNY, ELIZABETH (1886-1952). In 1909, in the lonely bush country of Australia, a young nurse, Elizabeth Kenny, developed a method of treating infantile paralysis. A few years later she established a small hospital at Clifton, South Queensland. She served as a nurse in the first World War and afterward set up a clinic for crippled children at Townsville, Queensland. Her title "Sister" indicates "nurse," in accordance with British custom.

Sister Kenny brought her method to the United States in 1940. The Uni-

versity of Minnesota invited her to work and teach in Minneapolis. This city opened an Elizabeth Kenny Institute in 1942. A year later a Sister Elizabeth Kenny Foundation was organized, with headquarters in Minneapolis. This foundation provides training in the Kenny method. It has established Kenny institutes and clinics in various parts of the United States. State chapters help in its work. The Australian government also maintains several Kenny clinics.

Sister Kenny was born on a frontier farm at Warialda, New South Wales, Australia. At 16 she decided to become a missionary in India. She studied nursing at a hospital in Armidale, New South Wales. Then she decided that nursing at home was more important than missionary work abroad. Her first cases of infantile paralysis occurred in a lonely area far from doctors. She worked with the simple aids at hand—and her patients recovered. She then dedicated her life to fight the disease. Her treatment is based on relieving muscular spasm with hot compresses and re-education of affected muscles.

In 1950 the United States granted her the right to enter or leave the country without passport or visa. She died Nov. 30, 1952, in Toowoomba, Queensland.

KENT, ROCKWELL (born 1882). No modern artist can claim a more adventurous life than Rockwell Kent. In search of pictures he sailed around Cape Horn and was shipwrecked off Greenland. He lived in such faraway places as Newfoundland, Alaska, and Tierra del Fuego, as well as on his farm in upstate New York. A talented author, he wrote and illustrated books of his travels.

ELIZABETH KENNY



Her treatment of infantile paralysis made her famous.

Kent grew up in his birthplace, Tarrytown, N.Y., and New York City. His father died when the boy was young, and Rockwell's mother reared him. She was an energetic woman, and Kent inherited his love of activity from her. As a boy he liked to draw but did not seriously consider becoming an artist. At Horace Mann School in New York City he was an average pupil, with a normal boy's liking for fun and mischief.

He studied architecture at Columbia University but left school in his junior year. He had already begun to study painting under good teachers, but it was not until 1914 that he was able to make a living by art. Meantime he worked as a carpenter, gravedigger, lobster fisherman, and at other trades, painting all the while. In his first exhibition in 1905 he showed the landscapes and strong, simple figures that were later to win him fame.

In 1916 Kent moved to Newfoundland, the first of his journeys outside the United States to wild and

lonely places. Then followed other extensive trips described in his books. These were 'Wilderness' (1920), about his stay in Alaska; 'Voyaging Southward from the Strait of Magellan' (1924); 'N by

A MODERN ARTIST AND HIS WORK



Rockwell Kent's oil painting of Mount Equinox in Vermont is typical of his stark, powerful landscapes. The artist himself is shown at the top.



E' (1930), about adventure at sea; and 'Salamina' (1935), a story of his Eskimo housekeeper. His book 'This Is My Own' (1940) is a partial autobiography. Kent illustrated special editions of 'Moby Dick', 'Candide', 'Leaves of Grass' and Shakespeare.

Kent was married three times and had five children. His son, Rockwell, Jr., then nine, accompanied him to Alaska; and Gordon, then fourteen, spent a year in Greenland. There the boys lived almost as natives, fishing and hunting while their father painted.

In OLD KENTUCKY, the Bluegrass STATE



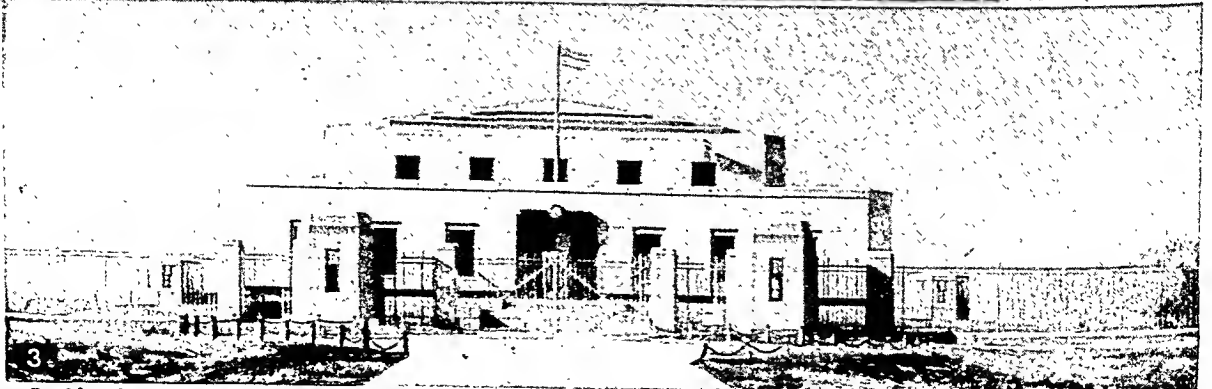
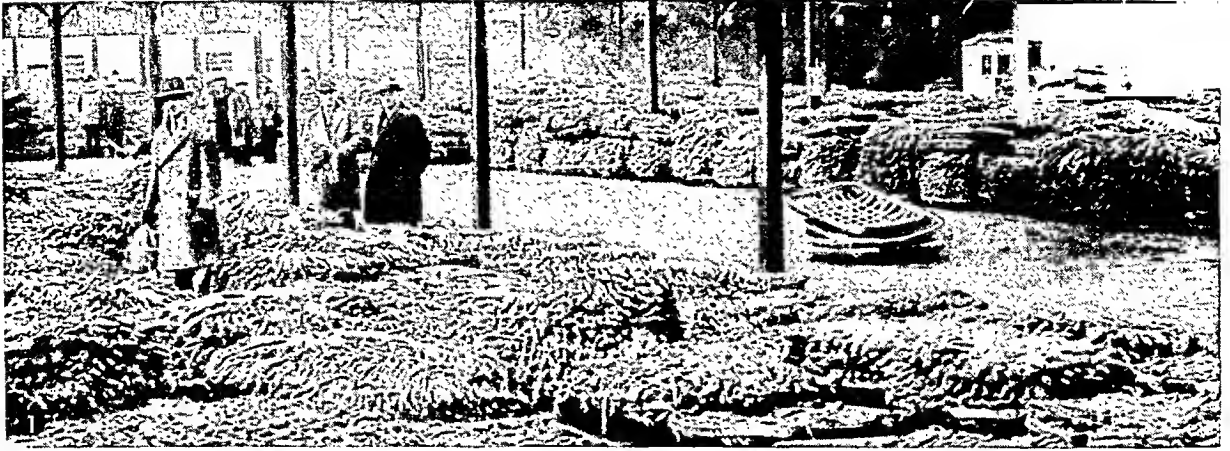
Horses and Crops Thrive on the Rich, Rolling Pasture Land of Kentucky's Bluegrass Region

KENTUCKY. In the favored east central part of the United States lies Kentucky, on a stretch of about 400 miles from the Cumberland Mountains in the east to the Mississippi River in the west. Within these limits are rugged mountains, thick forests, and rolling meadow land. The ridges and narrow valleys of the Cumberland Plateau to the east and southeast

make up about one-fourth of the state. To the north and west stretches an uneven succession of rolling hills, plateaus, and plains. This area may be divided into five regions, each taking its name from some distinguishing characteristic of the land.

In the northern bulge of the state lies the famous Bluegrass area, a rolling meadowland, about 800 to

TREASURE AND TRADE WEST OF THE "GAP"



1. In this tobacco market at Louisville, hundreds of trays of burley are sold each year. 2. We look through Cumberland Gap toward Kentucky. On the right rises Virginia. The left slope is Tennessee. The gentle crests in the background are the mountains of southeastern Kentucky. Pioneers first entered Kentucky through this gap in the Cumberland Mountains. 3. Gold worth billions of dollars is stored in the Gold Bullion Depository built by the United States Treasury at Fort Knox in 1936.

1,000 feet above sea level. This region, named for its bluish-tinted grass, covers about 10,000 square miles, or nearly a quarter of the state. The blue grass provides rich grazing, and the cropland is one of the most fertile in the world.

Encircling the Bluegrass region on three sides is the *Knobs*, a narrow band of wooded ridges and knob-like hills. Much of the soil here erodes too rapidly to provide

good cropland. The *Pennyroyal*, which is named for the variety of mint plant common in the area, reaches from the mountains in the east to the Tennessee River in the west. It is a region of gently rolling farm lands broken by patches of rocky hills and round depressions called "sinkholes." Beneath many places underground water has carved out huge caverns and passageways.

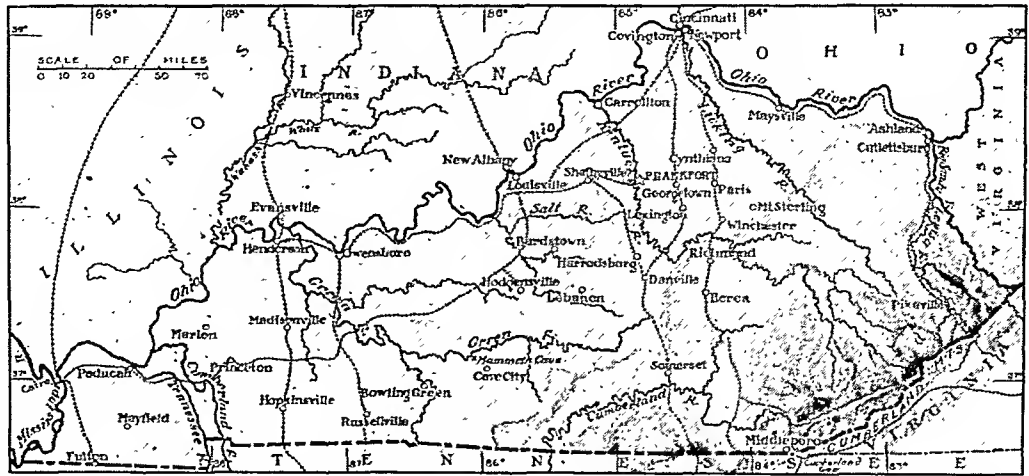
In the north the *Pennyroyal* (popularly named *Pennyrile*) is shaped like a horseshoe with the open end facing the Ohio River. Between the two arms lies the western coal field, containing rich coal deposits. The fertile bottomlands produce good crops but elsewhere the region is marked with wooded and sandstone ridges. The western corner of Kentucky, between the Tennessee and Mississippi rivers, is known as the Jackson Purchase, because Andrew Jackson aided in purchasing this land from the Chickasaw Indians. Wide flood plains make the Purchase, as it is often called, the lowest area in the state.

Agriculture Is Important in Kentucky

In pioneer days, even though much of the state was still covered with virgin forest, Kentucky ranked high as an agricultural state. In 1839 hemp was the leading money crop. Other profitable farm products at that time were corn, hogs, oats, and rye. By 1865 Kentucky was the leading tobacco state. Today Kentucky grows more tobacco than any other state except North Carolina. Corn, hogs, cattle, milk, hay, eggs, and poultry are also important farm products.

For many years Kentucky raised almost all the hemp in the United States. It was sown in the first Kentucky clearings. It furnished fiber for the pioneers' clothing and was the local medium of exchange, even being acceptable for taxes. Kentucky early became one of the leading hemp-producing regions of the world, and great fortunes were made in it before the Civil War. Hemp has long ceased to be the money-making crop of the state, and in recent years has been almost entirely replaced by other crops except in the Kentucky River valley (*see* Hemp).

THE STATE BETWEEN NORTH AND SOUTH



With the Ohio River separating it from the industrial North and its southern boundary well within Dixie Land, Kentucky shares the characteristics of both regions. On the one hand are manufacturing centers and on the other rich plantation districts. The eastern third of the state runs into the Appalachian Range.

The state's chief pride, however, is in its famous Kentucky thoroughbred horses. A mild winter climate, splendid pasturage the year round, and abundant water, particularly in the Bluegrass region, marked the state as naturally adapted to stock raising. In pioneer times shorthorn cattle were raised on the Kentucky plains and driven across the mountains to eastern markets. Later, hogs became the leading farm animals.

But Kentuckians were not satisfied with quantity. Their desire for quality found expression in the development of some of the best race horses in the country. As early as 1775 Daniel Boone introduced a resolution in the Virginia legislature to improve the breeding of Kentucky horses.

Since then breeders have produced strains of thoroughbred saddle horses which combined speed and endurance. About one-half of the winners on American race tracks, as well as many Kentucky Derby winners, have been Kentucky horses. The first Derby was run at Louisville in 1875. It is now one of the most popular sporting events in the nation.

The State's Transportation

Land, air, and water transportation unite Kentucky and link it with other states. The state as a whole is served by a railway network totaling about 3,600 miles and by a number of transcontinental and regional airlines. Several barge lines operate on the Ohio and the Mississippi rivers.

Road building has progressed rapidly. Stretching across the state are many federal and state highways. Many miles of other hard-surfaced roads between county seats extend the transportation network. In some mountain regions, however, there are still small, isolated communities reached only over gravel roads or horseback trails. In 1954 a 40-mile toll road between Louisville and Elizabethtown was under way.

Kentucky's Manufacturing Industries

Manufacturing ranks next to agriculture in the number of workers employed. Kentucky's transportation network has contributed to the growing indus-

trial importance of the state, particularly during and after World War II. Most of the principal manufacturing centers are on the Ohio River.

Kentucky has abundant natural resources. Its industries are based on the processing of raw materials from its farms, mines, and forests. The largest single industry is the production of distilled liquors. Also important are food products, fabricated metal products, machinery, and chemicals. The state is a leading producer of cigarettes and cigars.

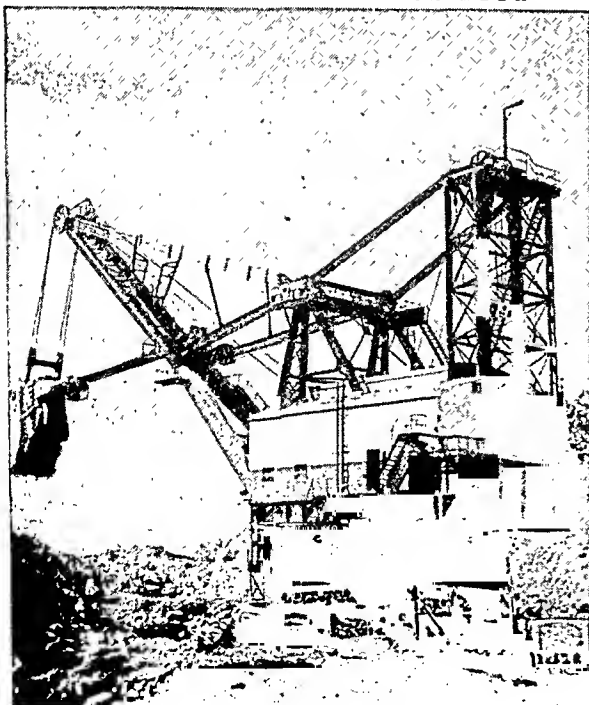
Louisville is the chief city and manufacturing center of the state (*see* Louisville). Covington stands where the Licking River enters the Ohio opposite Cincinnati. It is an industrial city with meat-packing and tobacco plants. Across the Licking River is Newport, a residential city with metal manufactures.

Lexington, in the heart of the Bluegrass, is noted for its tobacco markets and horse farms. Owensboro is an oil, tobacco, and industrial center in the west. Paducah, on the Tennessee where it meets the Ohio, is a tobacco market with railway shops. West of the city is a uranium refining plant, supplied with power by the nearby Shawnee steam plant of the Tennessee Valley Authority. Ashland, in the north, is a railway- and river-shipping point with steel mills, coke ovens, and oil refineries. Frankfort, the state capital, has large distilleries (*see* Frankfort).

The Mountain Region

The mountain belt in eastern Kentucky differs sharply from the rest of the state, just as it does in

MANY TONS IN A SINGLE BITE



This mechanical monster, working in a coal-strip mine, is one of the world's largest electric stripping shovels. Kentucky ranks high in mineral production and coal is its leading product. Only Pennsylvania and West Virginia mine more coal.

most of the Southern states through which the Appalachians run. So long as the early migrants to the West used the mountain roads, this region had communication with the eastern seaboard. Beginning about 1830, however, other routes to the West came into use and the mountaineers were isolated.

The area became known for feuds, "moonshining," and lawlessness in "bloody Breathitt" and other mountain counties. Lacking schools, records, roads, and money, the mountaineers had a high percentage of illiteracy. They had few links with the past except their names (largely English and Scottish), their speech, in which lingered many words obsolete elsewhere since Shakespeare's time, and their old customs and ballads. These hardy mountaineers make up about a quarter of the state's population. Abraham Lincoln was born in Kentucky of mountaineer stock.

For years, hookworm and pellagra seriously drained the mountain people's vitality, but campaigns by national, state, and local public-health agencies have greatly reduced these diseases. The bloody feuds between rival families and the illegal making of "moonshine" whiskey have decreased considerably. At the same time the mountaineers have become more interested in education and family welfare. They are being helped toward better living by schools, colleges, and farm and home demonstration agents.

Mineral Wealth and Other Resources

Kentucky is one of the leading coal-producing states. Natural gas and petroleum are found in many parts of the state and new reserves have been discovered. Iron ore is found in northeastern Kentucky, but is not extensively mined. Limestone underlies the whole state, and much of it is good for building. An excellent structural stone is also found. Clay and cement rock are abundant. Near Louisville are large deposits of asphalt rock. Fluorspar, zinc, and lead are also mined.

Most of Kentucky was once covered with hardwood forests. Now about two fifths of the state is forested. The eastern part is particularly well wooded.

The state attracts many visitors with its forested mountains and valleys. Among its scenic wonders are Mammoth Cave and Cumberland Falls. Man-made lakes, such as Kentucky Lake (Kentucky Dam), Lake Cumberland (Wolf Creek Dam), and Herrington Lake (Dix Dam), are noted for fishing and other sports.

History of Kentucky

As the scene of bitter wars among Shawnee, Cherokee, and Chickasaw Indians, this region was early known as the "dark and bloody ground." In 1671 Thomas Batts and Robert Fallam crossed the Alleghenies from Virginia in search of a passage to the "South Seas." In 1750 land companies in the East sent Thomas Walker to explore the Cumberland Gap region; and the following year they sent Christopher Gist up the Ohio as far as Louisville.

In 1769 backwoodsmen from the Yadkin district in North Carolina led by Daniel Boone came looking for land (*see* Boone). They stayed so long that Kentuckians were often called "long hunters."

Kentucky Fact Summary



KENTUCKY (Ky.): Common meaning, *dark and bloody ground*, from early battles between northern and southern Indians. Probably from *Ken-take*, Indian word meaning "meadow land" or "prairie."

Nickname: "Bluegrass State," from unusual grass found within the state.

Seal: Two friends shaking hands, surrounded by words, "United We Stand, Divided We Fall." "Commonwealth of Kentucky" written in outer border.

Motto: United We Stand, Divided We Fall.

Flag: For description and illustration, see Flags.

Flower: Goldenrod. **Bird:** Cardinal, commonly known as the redbird. **Tree (unofficial):** Tulip tree. **Song:** 'My Old Kentucky Home', words and music by Stephen Collins Foster.

THE GOVERNMENT

Capital: Frankfort (since 1792).

Representation in Congress: Senate, 2; House of Representatives, 8. Electoral votes, 10.

General Assembly: Senators, 38; term, 4 years. Representatives, 100; term, 2 years. Convenes Tuesday after the first Monday in January in the even-numbered years; session limit, 60 days.

Constitution: Adopted 1891. Proposed amendment must be (a) passed by a three-fifths vote of both houses of the legislature and (b) ratified by majority voting on amendment at a popular election.

Governor: Term, 4 years. May not succeed himself.

Other Executive Officers: Lieutenant governor, secretary of state, attorney general, treasurer, auditor, commissioner of agriculture, superintendent of public instruction, clerk of court of appeals, all elected; terms, 4 years; may not succeed themselves.

Judiciary: Court of Appeals—7 justices, elected by districts; term, 8 years. Circuit courts—40 districts; judges elected; term, 6 years. County courts—1 in each county; judges elected; term, 4 years.

County: 120 counties, governed by fiscal courts consisting of a judge and magistrates or a judge and 3 commissioners, all elected; terms, 4 years.

Municipal: Mayor and council form of government most common; some cities have commission or city-manager form.

Voting Qualifications: Age, 21; residence in state, 1 year; in county, 6 months; in precinct, 60 days.



TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 3,600 miles. First railroad, Lexington to Frankfort (now part of Louisville & Nashville), 1832. Rural roads, 60,000 miles. Airports, 51.

Communication: Periodicals, 54. Newspapers, 196. First newspaper, *Kentucky Gazette*, Lexington, 1787. Radio stations (AM and FM), 54; first station, WHAS, Louisville, licensed July 18, 1922. Television stations, 5; first station, WAVE-TV, Louisville, began operation Nov. 24, 1948. Telephones, 551,400. Post offices, 2,122.

THE PEOPLE AND THEIR LAND

Population (1950 census): 2,944,806 (rank among 48 states—19th); urban, 36.8%; rural, 63.2%. Density: 73.9 persons per square mile (rank—17th state).

Extent: Area, 40,395 square miles, including 531 square miles of water surface (36th state in size).

Elevation: Highest, Big Black Mt. near Lynch, 4,150 feet; lowest, Mississippi R. near Hickman, 257 feet.

Temperature (°F.): Average—annual, 57°; winter, 37°; spring, 56°; summer, 75°; fall, 58°. Lowest recorded, -33° (Sandy Hook, Feb. 11, 1899); highest recorded, 114° (Greensburg, July 28, 1930).

Precipitation: Average (inches)—annual, 46; winter, 12; spring, 13; summer, 12; fall, 9. Varies from about 40 in north central to about 50 in south central.

Natural Features: Cumberland Plateau and Mountains in east; in center, Bluegrass region; in extreme northwest, fertile river bottoms. Principal rivers: Big Sandy, Cumberland, Green, Kentucky, Licking, and Tennessee, all flowing into the Ohio River, which forms the northern boundary. Mississippi River forms part of western boundary. Reelfoot Lake in far southwest.

Land Use: Cropland, 25%; nonforested pasture, 27%; forest, 41%; other (roads, parks, game refuges, cities, etc.), 7%.



Natural Resources: *Agricultural*—fertile soil, high mineral content in Bluegrass region produces excellent feed crops; temperate climate and adequate rainfall.

Industrial—excellent coal and petroleum and natural-gas fields, limestone deposits, large tobacco crops.

Commercial—rivers for heavy freight traffic; horse breeding and racing.

OCCUPATIONS AND PRODUCTS

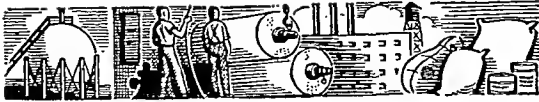
What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Agriculture, forestry, and fishery..	246,098	25.7
Manufacturing.....	150,866	15.8
Wholesale and retail trade.....	147,580	15.5
Transportation, communication, and other public utilities.....	72,938	7.6
Mining.....	69,703	7.3
Professional services (medical, legal, educational, etc.).....	65,100	6.8
Construction.....	54,017	5.7
Personal services (hotel, domestic, laundering, etc.).....	53,212	5.6
Government.....	29,142	3.1
Business and repair services.....	21,694	2.3
Finance, insurance, and real estate.	20,494	2.1
Amusement, recreation, and related services.....	7,589	0.8
Workers not accounted for.....	16,553	1.7
Total employed.....	954,986	100.0

Kentucky Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—24th) Value added by manufacture* (1952), \$1,062,980,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
FOOD AND KINDRED PRODUCTS Distilled liquors; grain-mill products; malt liquors; dairy products	\$288,814,000	11
FABRICATED METAL PRODUCTS Heating and plumbing equipment; structural metal products	51,024,000	17
CHEMICALS AND ALLIED PRODUCTS . . (Such as industrial inorganic chemicals; paints, etc.)	47,953,000	25
TOBACCO MANUFACTURES Cigarettes; tobacco stemming and redrying; cigars	41,784,000	4
MACHINERY (EXCEPT ELECTRICAL) . APPAREL AND RELATED PRODUCTS . . Men's and boys' furnishings; men's and boys' suits and coats	40,461,000 38,475,000	18 17

*For explanation of value added by manufacture, see Census.



B. Farm Products (Rank among states—20th) Total cash income (1952), \$576,331,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Tobacco	395,536,000 lbs.	1	2
Corn	76,584,000 bu.	2	10
Milk	998,000,000 qts.	3	17
Cattle	330,566,000 lbs.	4	19
Hogs	441,107,000 lbs.	5	12
Hay	2,334,000 tons	6	18
Eggs	95,000,000 doz.	7	17
Chickens	78,402,000 lbs.	8	21

*Rank in dollar value †Rank in units produced



C. Minerals (Fuels, Metals, and Stone) Annual value (1951), \$442,264,000 Rank among states—8th

Minerals (1951)	Amount Produced	Value
Coal	74,972,000 tons	\$366,687,000
Petroleum	11,622,000 bbls.	32,190,000
Natural gas	76,097,000,000 cu. ft.	16,513,000
Stone	7,049,000 tons	8,610,000

D. Lumber (Rank among states—19th) 462,000,000 board feet (5-year average)

E. Trade

Trade (1948)	Sales	Rank among States
Wholesale	\$1,787,816,000	26
Retail	1,682,087,000	24
Service	141,873,000	26

EDUCATION

Public Schools: Elementary, 3,889; secondary, 139; combined elementary and secondary, 369. Compulsory school age, 7 through 15. State Board of Education is composed of supt. of public instruction, elected, and 7 lay members appointed by governor; 4-year terms. County and city school board members elected. In each county and independent school district, board of education appoints a supt. of schools, for a given term.

Private and Parochial Schools: 263.

Colleges and Universities (accredited): Colleges, 16; Junior colleges, 12. State-supported schools include the Univ. of Kentucky. Lexington; Kentucky State College for Negroes, Frankfort: 4 state colleges—Morehead, Murray, Eastern Kentucky at Richmond, Western Kentucky at Bowling Green.

Special State Schools: Mayo State Vocational School, Paintsville; North. Ky. State Vocational School, Covington; Ky. School for the Blind, Louisville; Ky. School for the Deaf, Danville; West Ky. Vocational Training School for Negroes, Paducah; Lincoln Inst. for Negroes, Lincoln Ridge.

Libraries: City and town libraries, 90; 61 give free service to county residents; 9 others charge a small fee; 12 counties give service by bookmobile; 37 counties participate in state aid program. Library Extension Division aids in developing public libraries; work headed by director. State Dept. of Education aids in developing school libraries; work headed by supervisor.

Outstanding Museums: Baker-Hunt Foundation Museum, Covington; Kentucky Historical Society, Frankfort; Audubon Museum, Henderson; J. B. Speed Art Museum, Louisville.

CORRECTIONAL AND PENAL INSTITUTIONS

Kentucky Village (boys and girls), Greendale; Kentucky Children's Home, Lyndon; Kentucky State Reformatories—(for men) LaGrange; (for women) Pewee Valley; Kentucky State Penitentiary, Eddyville.

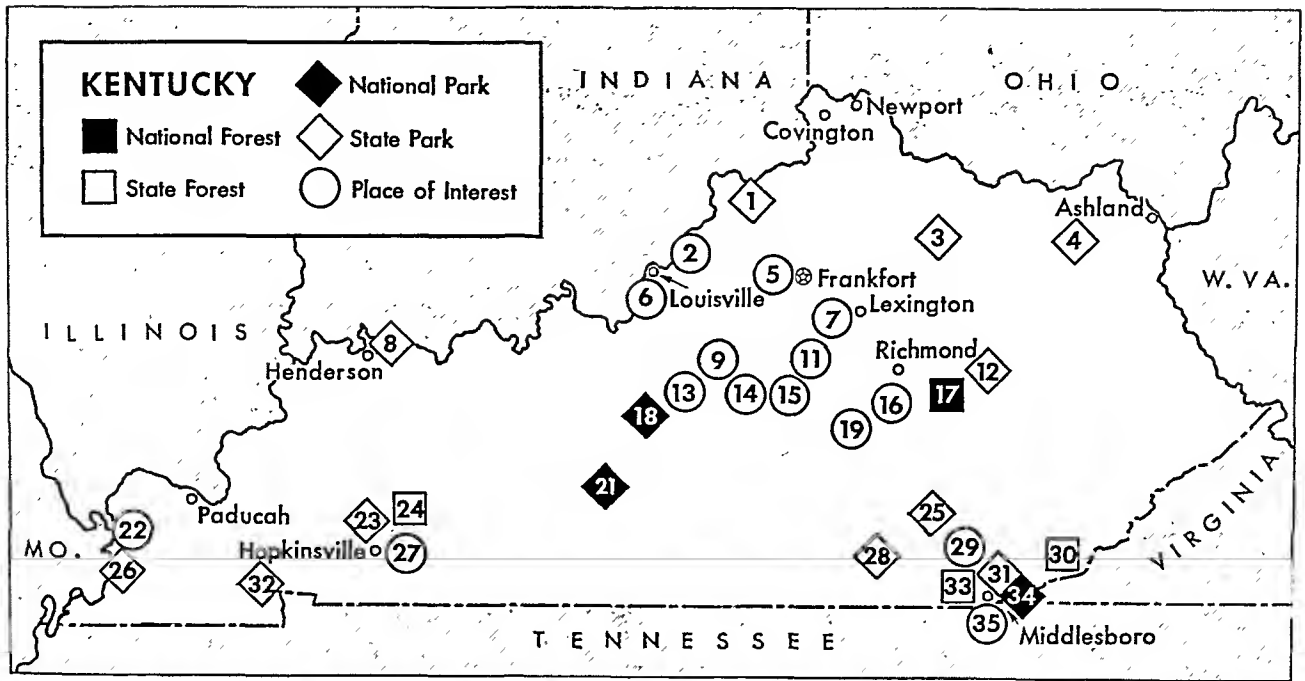
PLACES OF INTEREST*

Abbey of Our Lady of Gethsemane—near New Haven; Trappist monastery founded in 1848 (13).
Bardstown—many fine houses of Georgian Colonial and Greek Revival design; St. Joseph's Cathedral (9).
Berea College—mountain school founded in 1855 (16).
Boone Memorial—limestone monolith marking graves of Daniel and Rebecca Boone; in Frankfort (5).
Dr. Thomas Walker Memorial—replica of first house built by white man in state (1750); near Barbourville (29).
Frankfort—State Capitol; Old State Capitol; Frankfort Cemetery; Shady Lane, old pike (see Frankfort) (5).
Jefferson Davis Monument—east of Hopkinsville; 351-ft. shaft to memory of president of the Confederacy (27).
King Mounds (Ancient Buried City)—Wickliffe; unearthened mounds exhibit remains in original positions (22).
Lexington—Bluegrass horse farms; Ashland, reconstructed home of Henry Clay; Transylvania College; University of Kentucky; Keeneland Race Course (7).
Liberty Hall—Frankfort home of John Brown, first United States senator from Kentucky (5).
Lincoln Homestead—replica of cabin belonging to the president's grandfather; near Springfield (14).
Louisville—famous Churchill Downs (see Louisville) (6).

*Numbers in parentheses are keyed to map.



Kentucky Fact Summary



Mud Meeting House—near Harrodsburg; original Dutch Reformed church built in early 1800's (11).

"My Old Kentucky Home"—near Bardstown; Stephen C. Foster believed to have written song here (9).

Old Mulkey Meeting House Memorial—near Tompkinsville; state's oldest log meeting house (1798); grave of Daniel Boone's sister, Hannah; near symbol (21).

Perryville Battlefield Monument—site of bloodiest Civil War battle in state, fought Oct. 8, 1862 (15).

Pinnacle Mountain—view of six states from 1,600 feet above nearby city of Cumberland Gap, Tenn. (35).

Shakertown—called "Pleasant Hill," communal town founded by Shakers in 1805; near Harrodsburg (11).

Tomb of Zachary Taylor—Taylor National Cemetery (2).

Weisiger Memorial—Constitution Square in Danville; state's first constitution framed here, 1792 (15).

William Whitley Home—near Stanford; believed first brick house west of Alleghenies (1780's) (19).

STATE PARKS*

Audubon—John James Audubon Memorial Museum, fine collection of bird information; near Henderson (8).

Blue Licks Battlefield—museum exhibits pioneer and Indian relics; between Paris and Maysville (3).

Carter Caves—furnished saltpeter for gunpowder used at battle of New Orleans (1815); near Olive Hill (4).

Cherokee—recreational area on Kentucky Lake (32).

Columbus-Belmont Battlefield—"Iron Banks," breastworks built on the Mississippi during Civil War (26).

Cumberland Falls—68-ft. waterfall; near Corbin (28).

General Butler—recreational area near Carrollton (1).

Kentucky Dam Village—on Kentucky Lake; large recreational area, includes tennis courts and beach (32).

Kentucky Lake—park on west side of the artificial lake formed by Kentucky Dam on the Tennessee River (32).

Lake Cumberland—Wolf Creek Dam forms lake in mountains; near Jamestown; water sports; west of (28).

Levi Jackson Wilderness Road—scene of Defeated Camp, state's bloodiest Indian massacre; near London (25).

Natural Bridge—near Slade; rock arch, with clearance 92 ft. high and 76 ft. wide at bottom, over roadway (12).

*Numbers in parentheses are keyed to map.

Pennyrile Forest—near Dawson Springs; recreational area in a state forest; water sports on lake (23).

Pine Mountain—near Pineville; natural amphitheater; site of annual Mountain Laurel Festival (31).

Pioneer Memorial—Harrodsburg; replica of Fort Harrod, state's first white settlement, built in 1774; west of symbol (11).

NATIONAL HISTORICAL AND NATIONAL PARKS*

Abraham Lincoln—117 acres on Old Sinking Spring Farm, once owned by Lincoln's father, Thomas; marble and granite memorial building encloses restored log-cabin birthplace of Lincoln (18).

Cumberland Gap (project)—20,000 acres in Kentucky, Tennessee, and Virginia; includes historic gap used by Daniel Boone and other pioneers (34).

Mammoth Cave—50,696 acres of valleys, streams, and forested hills; Mammoth Cave, on five levels, contains vast chambers of stalactites and stalagmites, underground streams (21).

NATIONAL FOREST*

Cumberland—1,357,085 acres; hdqrs., Winchester (17).

LARGEST CITIES (1950 census)

Louisville (369,129): Ohio River port; wholesale and distributing center; railroad shops; liquor, cigarettes, metal and timber products; textiles and chemicals.

Covington (64,452): industrial city opposite Cincinnati; manufactures X-ray equipment, paper bags, iron fences.

Lexington (55,534): heart of Bluegrass region; tobacco auctions; horse breeding and training; livestock market.

Owensboro (33,651): oil and tobacco center; radio tubes.

Paducah (32,828): railroad shops; tobacco market; manufactures shoes, hosiery, automotive parts.

Ashland (31,131): coal, natural-gas area; iron and steel.

Newport (31,044): steel and rolling mills; clothing.

Bowling Green (18,347): farm center, industries, colleges.

Henderson (16,837): agricultural and industrial center.

Middlesboro (14,482): resorts, coal mines, industries.

Hopkinsville (12,526): livestock market; tobacco.

Frankfort (11,916): state capital; large distilleries.

Kentucky Fact Summary

STATE FORESTS*

- Kentonia (Harlan County)—3,624 acres; area managed for timber production only (30).
 Kentucky Ridge (Bell County)—11,962 acres; area managed for timber production, recreation, and wildlife restoration (33).
 Pennyryle (Christian and Caldwell Counties)—14,797 acres; area managed for timber production, recreation, and wildlife restoration (24).

THE PEOPLE BUILD THEIR STATE

- 1584—Sir Walter Raleigh receives charter for "Virginia," including Kentucky.
- 1671—Thomas Batts and Robert Falam sent by Abraham Wood from Fort Henry, Va., to explore region west of Allegheny Mountains; search for river passage to the "South Seas"; they travel through the Kentucky area as far as Ohio River valley.
- 1682—René Robert Cavalier, Sieur de La Salle, claims all of region drained by Mississippi River for France; area includes virtually all Kentucky.
- 1742—John Peter Salley leads party from Virginia to Ohio River; French capture the group.
- 1750—Thomas Walker discovers Cumberland Gap.
- 1751—Christopher Gist explores area along Ohio River.
- 1763—Kentucky included in area ceded by France to Britain in Treaty of Paris. King George III of Great Britain forbids all settlement west of Appalachian divide.
- 1769—Daniel Boone, John Findley, and other hunters explore Kentucky and blaze new trails.
- 1772—Virginia colony creates Fincastle (later Kentucky) County; it includes present Kentucky.
- 1773—Capt. Thomas Bullitt leads party to Falls of Ohio River; surveys site of Louisville.
- 1774—James Harrod starts building Harrodsburg; Indians attack, forcing settlers to withdraw.
- 1775—Virginians settle at Harrodsburg, Boiling Springs (Mercer County), and St. Asaph (Lincoln County); Richard Henderson gets treaty from Cherokee Indians, March 17, acquiring all land between Ohio and Cumberland rivers west of the Appalachians for Transylvania Land Company; company sends Daniel Boone as leader of North Carolina settlers to found Boonesborough (now Boonsboro). First school in Kentucky opens at Harrodsburg. Hemp, for years Kentucky's second major crop, first grown near present Danville.
- 1776—Harrodsburg settlers, jealous of Boonsboro, send George Rogers Clark and John Jones to ask Virginia's aid; Virginia declares Transylvania Company illegal; creates Kentucky County.
- 1778—Indians lay siege to Boonsboro but are repulsed. George Rogers Clark organizes Kentucky expedition to attack British north of Ohio River.
- 1780—Transylvania Seminary chartered; opened near Danville, 1785; removed to Lexington, 1788; merged with Kentucky Academy (founded 1796) to become Transylvania University, 1798.
- 1782—Last important Indian battle in Kentucky takes place at Blue Licks, August 19; despite their victory, Indians withdraw from region.
- 1784—First of ten conventions held, December 27, to prepare way for separation of Kentucky from Virginia.

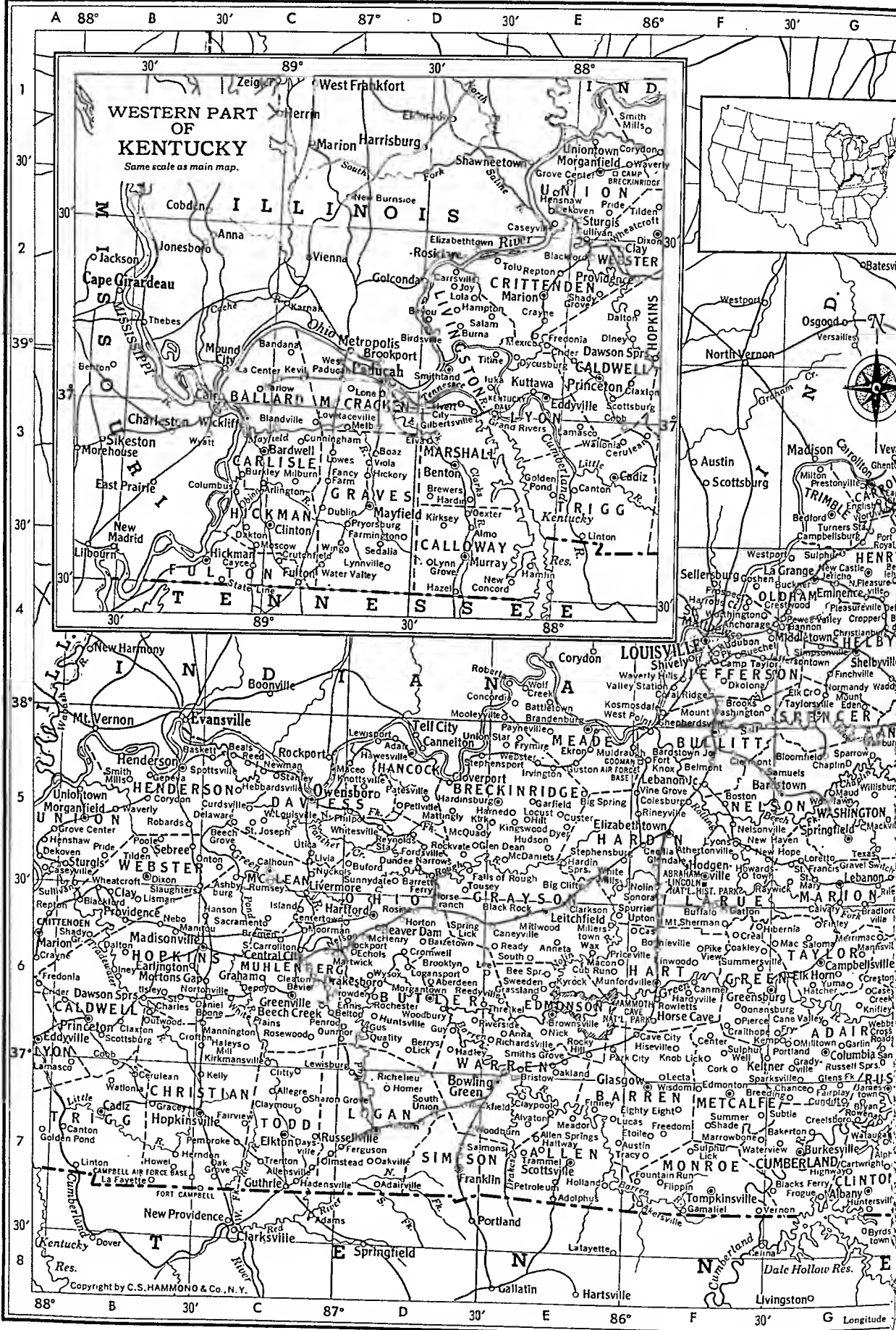


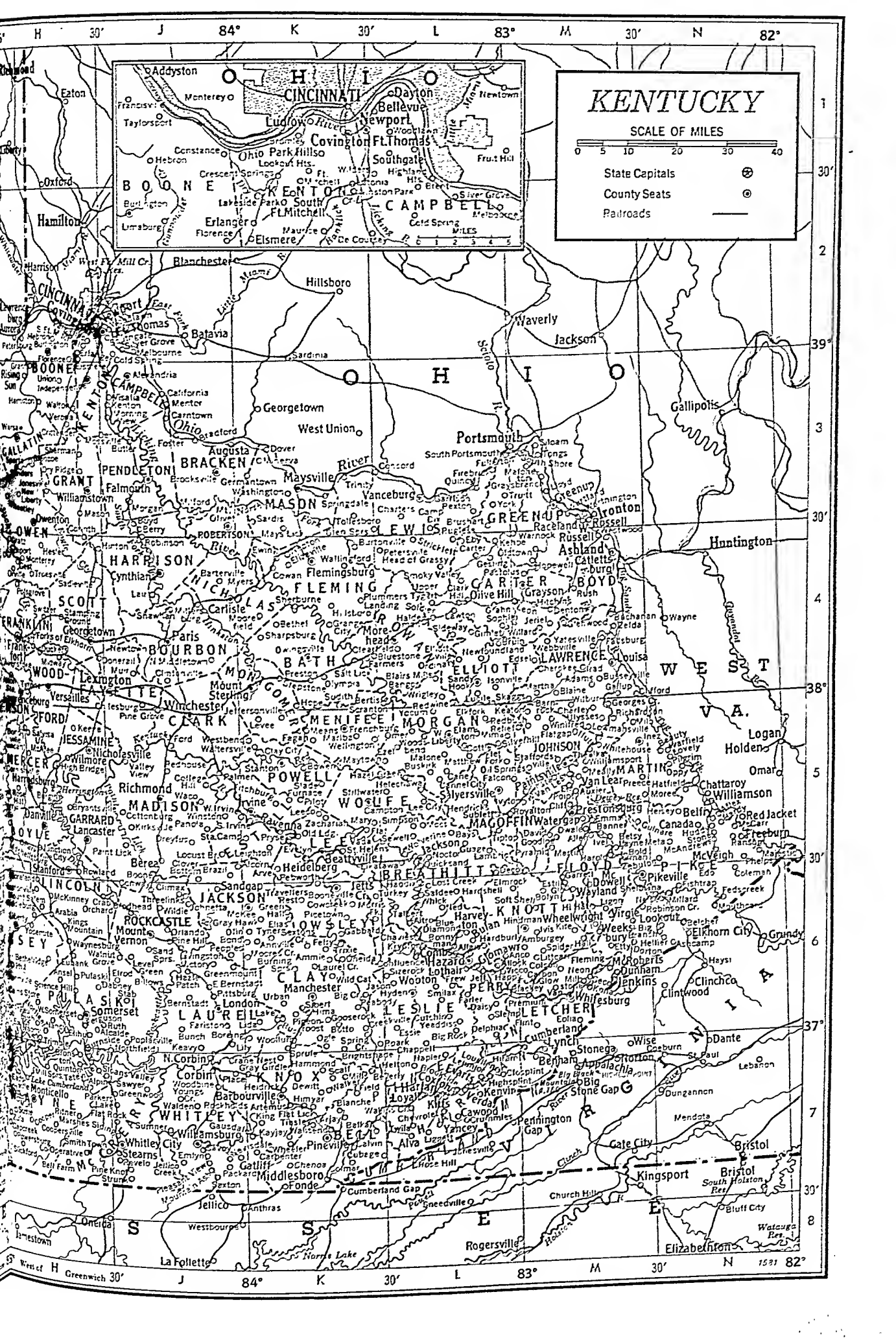
- 1789—Whiskey distillery opened at Georgetown.
- 1792—Kentucky becomes 15th state, June 1; governor, Gen. Isaac Shelby; capital, Lexington, but Frankfort designated permanent capital site, December 8.
- 1794—Wilderness Road (Cumberland Gap to present Louisville) opened to wheeled traffic. Kentucky Academy is first public school authorized by a U. S. state legislature. Gen. "Mad Anthony" Wayne's victory over Indians at battle of Fallen Timbers in Ohio frees Kentucky from threat of Indian attacks.
- 1798—Legislature passes Kentucky Resolutions opposing U. S. Alien and Sedition laws.
- 1799—Mammoth Cave first discovered by the white man.
- 1803—Louisiana Purchase removes threat of foreign blockade of Mississippi River trade.
- 1805—Building of canal around Falls of the Ohio River (Louisville) chartered; canal completed, 1829.
- 1806—Bank of Kentucky chartered.
- 1811—Henry Clay first elected to Congress by Kentucky. *New Orleans* is first steamboat on Ohio River.
- 1812—Kentuckians bear brunt of war with England north of the Ohio River and in New Orleans.
- 1815—*Enterprise* is first steamboat to reach Louisville from New Orleans, May 30.
- 1819—First oil well drilled along Cumberland River.
- 1825—State's first tobacco market opens at Louisville.
- 1833—Legislature prohibits importation of slaves.
- 1837—University of Louisville opened (chartered 1798); one of oldest municipal universities in U. S.
- 1838—State public-school system founded.
- 1849—Zachary Taylor, Kentucky hero of Mexican War, becomes 12th president of U. S.
- 1860—Kentucky votes against Abraham Lincoln (born near Hodgenville) as president of U. S.; opposes him on slavery issue. Lincoln, however, wins election as 16th president (1st Republican) of U. S.
- 1861—Kentucky declares its neutrality in Civil War. Invasion by both sides brings war to state.
- 1862—Last major battle in state fought near Perryville; General Buell turns back General Bragg's Confederates. Union forces control most of state in war.
- 1865—Kentucky Agricultural and Mechanical College founded at Ashland as part of Transylvania Univ.; becomes independent and moves to Lexington, 1878; becomes University of Kentucky, 1916.
- 1875—First Kentucky Derby held at Churchill Downs.
- 1891—Present state constitution adopted.
- 1924—Frontier Nursing Service established to serve residents of mountain and rural areas.
- 1934—Miners' strike in Harlan County inaugurates long period of labor unrest and violence in area.
- 1935—Fort Knox made U. S. gold depository.
- 1937—Worst flood in Ohio River's history inundates lowlands in northern and western Kentucky.
- 1941—Mammoth Cave National Park completed.
- 1944—Kentucky Dam on Tennessee River completed.
- 1946—Frederick Vinson, born at Louisa, becomes chief justice of U. S. Supreme Court; dies 1953.
- 1949—University of Kentucky admits first Negro students in its history.
- 1950—Atomic Energy Commission announces plans to build plant near Paducah.
- 1951—Wolf Creek Dam on Cumberland River dedicated.
- 1953—Severe drought in state. Shawnee steam plant of Tennessee Valley Authority supplies power to uranium separation plant near Paducah. Campaign for 100 bookmobiles for counties with few books.
- 1954—Work begun on Louisville-Elizabethtown turnpike.

*Numbers in parentheses are keyed to map on preceding page.

KENTUCKY

COUNTIES			CITIES AND TOWNS											
Adair	17,603	G 6	Oldham	11,018	G 4	Barterville	100	J 4	Burgin	777	H 5	Colson	200	M 6
Allen	13,787	E 7	Owen	9,755	H 3	Baskett	275	B 5	Burkesville	1,278	G 7	Columbia	2,167	G 6
Anderson	8,984	H 5	Owsley	7,324	K 6	Battletown	125	E 4	Burkley	340	C 3	Columbus	482	C 3
Ballard	8,545	C 3	Pendleton	9,610	J 3	Bayou	125	D 2	Burlington	400	J 2	Combs	800	L 6
Barren	28,461	F 7	Perry	46,566	L 6	Bays		L 5	Burna	300	D 2	Concord	142	L 3
Bath	10,410	K 4	Pike	81,154	N 6	Beals	150	C 5	Burning			Concordia	75	D 4
Bell	47,602	K 7	Powell	6,812	K 5	Beattyville	1,042	K 5	Springs	350	K 6	Confluence	285	L 6
Boone	13,015	H 3	Pulaski	38,452	H 6	Bcauty	577	N 5	Burnside	615	H 6	Constance	150	J 1
Bourbon	17,752	J 4	Robertson	2,881	J 3	Beaver Dam	1,349	D 6	Burton			Conway	75	J 6
Boyd	49,949	M 4	Rockcastle	13,925	J 6	Bedford	533	G 3	(Bypro)	257	*M 6	Cooper	275	H 7
Boyle	20,532	H 5	Rowan	12,708	L 4	Bee Spring		E 6	Burtonville	200	L 4	Coopersville	250	H 7
Bracken	8,424	J 3	Russell	13,717	G 7	Beech Creek		C 6	Bush	200	K 6	Coral Ridge	3,010	F 4
Breathitt	19,964	L 5	Scott	15,141	H 4	Beech Grove	162	C 5	Buskirk		L 5	Corbin	7,744	J 7
Breckinridge			Shelby	17,912	G 4	Belcher		N 6	Busseyville	100	M 4	Corinth	283	H 3
			Simpson	11,678	D 7	Belfry	1,315	N 5	Butler	404	J 3	Cork	83	F 6
			Spencer	6,157	G 4	Bel Farm		H 7	Cadiz	1,280	B 7	Cornishville	230	H 5
			Taylor	14,403	G 6	Bellevue	9,040	L 1	Cains Store		H 6	Corydon	742	B 5
Bullitt	11,349	F 5	Todd	12,890	C 7	Belmont	75	F 5	Calboun	746	C 5	Cottle		L 5
Butler	11,309	D 6	Trigg	9,683	E 3	Belton		D 6	California	117	J 3	Cottonburg	122	J 5
Caldwell	13,199	E 3	Trimble	5,148	G 3	Benham	3,982	M 7	Calvary	250	G 6	Covington	64,452	K 1
Calloway	20,147	D 4	Union	14,893	E 2	Benton	1,980	D 3	Calvert City	900	D 3	Cowan	200	K 4
Campbell	76,196	L 2	Warren	42,758	E 6	Berea	3,372	J 5	Calvin		K 7	Cowcreek	250	K 6
Carlisle	6,206	C 3	Washington			Bernstadt	300	J 6	Camp Dix	75	L 3	Coxton	700	L 7
Carroll	8,517	G 3		12,777	G 5	Berry	312	J 3	Camp Taylor	2,344	F 4	Crab Orchard	757	H 6
Carter	22,559	L 4	Wayne	16,475	H 7	Berrys Lick	50	D 6	Campbellsburg			Craihope	50	F 6
Casey	17,446	H 6	Webster	15,555	E 2	Bertis	97	K 4		361	G 3	Crane Nest	200	K 7
Christian	42,359	C 7	Whitley	31,940	J 7	Bcthel	225	K 4	Campbellsville			Crayne	300	A 6
Clark	18,898	J 5	Wolfe	7,615	K 5	Bethelbridge	190	H 6		3,477	G 6	Creal	30	F 6
Clay	23,116	K 6	Woodford	11,212	H 4	Bethlehem	188	G 4	Campton	431	K 5	Creekville	67	L 6
Clinton	10,605	G 7			Betsy Layne	1,500	M 5	Canada	1,500	N 5	Creelsboro	50	G 7	
Crittenden	10,818	E 2			Beverly	500	L 7	Cane Valley	150	G 6	Crescent Sprs.		K 1	
Cumberland	9,309	G 7			Bevier	175	C 6	Caney	400	L 5	Creston	25	G 6	
Daviess	57,241	C 5			Big Branch		M 6	Caneysville	377	E 6	Crestwood	450	G 4	
Edmonson	9,376	E 6	Aberdeen	50	D 6	Big Clifty	600	E 5	Canmer		F 6	Crider	125	B 6
Elliott	7,085	L 4	Adair	100	D 5	Big Creek	560	K 6	Cannel City	400	L 5	Crittenden	287	H 3
Estill	14,677	K 5	Adairville	800	D 7	Big Rock	430	L 6	Canton	250	B 7	Crofton	500	C 6
Fayette	100,746	J 4	Adams	300	M 4	Big Spring	250	E 5	Carbon Glow	300	M 6	Cromwell	200	D 6
Fleming	11,962	K 4	Adolphus	500	E 7	Billows	50	J 6	Carlisle	1,524	J 4	Cropper	175	G 4
Floyd	53,500	M 5	Afex	250	N 5	Birdsville	113	D 2	Carntown	100	J 3	Crummies	400	L 7
Franklin	25,933	H 4	Akersville	152	F 7	Black Rock	25	E 6	Carpenter		K 7	Crutchfield	170	C 4
Fulton	13,668	C 4	Albany	1,920	G 7	Blackey	393	M 6	Carrollton	3,226	G 3	Cub Run	250	E 6
Gallatin	3,969	H 3	Alcalde		J 6	Blackford	165	B 6	Carrsville	205	D 2	Cubage	325	K 7
Garrard	11,029	H 5	Alcorn	100	K 5	Blacks Ferry		G 7	Carter	84	L 4	Cumberland	4,249	M 6
Grant	9,809	H 3	Alexandria	536	J 3	Blaine		M 4	Cartwright	110	G 7	Cundiff	125	G 7
Graves	31,364	D 3	Allais	600	L 6	Blairs Mills		L 4	Casey Creek	117	G 6	Cunningham	275	C 3
Grayson	17,063	E 5	Allergic	125	C 7	Blanche	455	K 7	Caseyville	73	B 5	Curdsville	169	C 5
Green	11,261	F 6	Allen	421	M 5	Blandville	124	C 3	Cash	75	F 6	Custer	200	E 5
Greenup	24,887	M 3	Allen Springs		E 7	Bloomfield	666	G 5	Catlettsburg	4,750	M 4	Cutshin		L 6
Hancock	6,009	D 5	Allensville	337	C 7	Blue Diamond			Cave City	1,119	F 6	Cynthiana	4,847	J 4
Hardin	50,312	F 5	Allcock	608	L 6		1,968	L 6	Cawood	1,232	L 7	Dabney	80	J 6
Harlan	71,751	L 7	Almo	150	D 3	Bluestone	60	L 4	Cayce	200	C 4	Daisy	300	L 6
Harrison	13,736	J 4	Alpha	75	G 7	Boaz	100	D 3	Cecilia	400	F 5	Dalton	75	B 6
Hart	15,321	F 6	Alpine	150	H 7	Boldman	300	M 5	Center	175	F 6	Daniel Boone		C 6
Henderson	30,715	B 5	Alton Station	75	H 4	Bolyn	150	M 6	Centertown	370	C 6	Danville	8,686	H 5
Henry	11,394	G 4	Altro	75	L 6	Bond		J 6	Central City			David	800	M 5
Hickman	7,778	C 3	Alva	1,341	L 7	Bondville	91	H 5		4,110	C 6	Dawson Springs		
Hopkins	38,815	B 6	Alvaton	250	E 7	Bonnieville	300	F 6	Cerulean	218	B 7	Daysville	2,374	B 6
Jackson	13,101	J 6	Amburgey		M 6	Bonnyman	900	L 6	Cbance	350	G 7	Dayton	50	C 7
Jefferson	484,615	F 4	Ammie		K 6	Boone	137	J 5	Chaplin	200	G 5	De Coursey	8,977	L 1
Jessamine	12,458	H 5	Anchorage	883	F 4	Booneville	165	K 6	Cbappell		L 7	De Mossville	104	J 3
Johnson	23,846	M 5	Anco	400	L 6	Boreing	250	J 6	Cbarley		M 5	Decoy	250	L 5
Kenton	104,254	K 2	Anna		E 6	Boston	300	F 5	Charters	20	L 3	Defoe	142	G 4
Knott	20,320	M 6	Anneta	100	E 6	Botto	60	K 6	Cbavies	300	L 6	Dekoven	300	B 5
Knox	30,409	K 7	Annnville	350	K 6	Bowen	150	K 5	Cbenoa		K 7	Delaware	28	C 5
Larue	9,956	F 5	Ansel	195	H 6	Bowling Green			Cberokce		M 4	Delphia	395	L 6
Laurel	25,797	J 6	Arabia	229	H 6		18,347	D 7	Chevrolet	500	L 7	Denton	200	M 4
Lawrence	14,418	M 4	Arjay	1,000	K 7	Boyd	55	J 3	Chilesburg	50	J 4	Depoy		C 6
Lee	8,739	K 5	Arlington	584	C 3	Bradford	45	J 3	Christianburg	100	G 4	Dewitt	250	K 7
Leslie	15,537	L 6	Artemus	1,000	K 7	Bradfordsville	450	G 4	Clark Hill	400	L 4	Dexter	277	D 3
Letcher	39,522	M 6	Arvel		K 5	Brandenburg	755	E 6	Clarkson	489	E 6	Dixon	624	B 5
Lewis	13,520	L 3	Asbbyburg		C 5	Brazil		J 5	Claxton	72	B 6	Donansburg	200	F 6
Lincoln	18,668	H 6	Asbcamp		N 6	Breeding	100	G 7	Clay	1,291	B 6	Donerail	91	J 4
Livingston	7,184	D 2	Asbland	31,131	M 4	Bremen	410	C 6	Clay City	636	K 5	Dorton	500	M 6
Logan	22,335	D 7	Atbertonville	166	F 5	Brent		L 2	Claymour	150	C 7	Dover	334	K 3
Lyon	6,853	E 3	Auburn	994	D 7	Brewers	57	D 3	Clearfield	50	E 7	Drakesboro	1,102	D 6
Madison	31,179	J 5	Audubon Park			Brightsbade	200	K 7			L 4	Dreyfus	150	J 5
Magoffin	13,839	L 5		1,790	F 4	Bristow	73	E 6	Cleaton	450	C 6	Dry Ridge	640	H 3
Marion	17,212	G 5	Augusta	1,599	J 3	Brodhead	808	J 6	Clermont	40	F 5	Dublin	100	C 3
Marshall	13,387	D 3	Austin	150	F 7	Bromley	980	K 1	Cliff	500	M 5	Duckers	50	H 4
Martin	11,677	M 5	Auxier	1,000	M 5	Bronston	300	H 7	Clifford	50	N 4	Duncan	125	H 5
Mason	18,486	K 3	Avenstoke	125	H 4	Brooklyn	50	D 6	Clifty	200	C 7	Dundee	150	D 5
McCracken	49,137	D 3	Bagdad	400	G 4	Brooks	150	F 4	Climax	75	J 6	Dunbam	1,200	M 6
McCreary	16,660	J 7	Baizetown	127	D 6	Brookside	600	L 7	Clinton	1,593	C 3	Dunmor	156	C 6
McLean	10,021	C 5	Bakerton		G 7	Brooksville	622	J 3	Clintonville	100	J 4	Dunnaville	140	H 6
Meade	9,422	E 5	Balkan		K 7	Browder	350	D 6	Closploit	600	L 7	Dwale	495	M 5
Menifee	4,798	K 5	Bandana	300	C 2	Brownville	447	E 6	Clover Bottom			Dycusburg	147	E 3
Mercer	14,643	H 5	Bangor	155	L 4	Bruin	125	L 4		600	J 5	Dyer	39	E 5
Metcalfe	9,851	F 7	Banner		M 5	Brushart	50	L 3	Cloverport	1,357	D 5	Eadsville	300	H 7
Monroe	13,770	F 7	Barbourville			Bryan	137	G 7	Co-operative	400	H 7	Eagle Sta.	35	G 3
Montgomery				2,926	K 7	Bryantsville	126	H 5	Cobackley	150	F 6	Earlington	2,753	B 6
				4,154	G 5	Buckanan	160	M 4	Cobb	200	B 6	E. Bernstadt	900	J 6
Morgan	13,025	K 4	Bardstown			Buckner	250	G 4	Cold Spring	518	L 2	East Point	200	M 5
Muhlenberg	13,624	L 5	Bardstown Junction	75	F 5	Buebel	1,500	F 4	Coleman	200	N 6	Eby	50	L 4
			Bardwell	1,033	C 3	Buford	495	F 6	Colesburg	73	F 5	Ecbols	50	D 6
Nelson	19,521	F 5	Barlow	657	C 3	Bulan	100	D 5	College Hill	400	J 5	Eddyville	1,840	B 7
Nicholas	7,532	J 4	Barnrock		M 5	Bunch	1,446	L 6	Collista	175	M 5	Edmonton	519	E 6
Ohio	20,840	D 6	Barretts Ferry	10	D 5			J 6	Colmar	500	K 7			





KENTUCKY — Continued

Edo	200	N 6	Frogue	300	G 7	Hazard	6,985	L 6	King	50	K 7	Maloneton	100	M 3
Edsel	50	M 4	Fry	50	G 6	Hazel	444	D 4	Kings Mt.	350	H 6	Manchester	1,706	K 6
Eighty Eight	75	F 7	Frymire	25	E 5	Hazel Green	264	K 5	Kingsley	488	*F 4	Manitou	100	B 6
Ekron	188	E 5	Fullerton	1,501	L 3	Hazle Patch		J 6	Kingswood	225	E 5	Mannington	300	C 6
Elamton		L 5	Fulton	3,224	C 4	Head of Grassy	50	L 4	Kirk	75	D 5	Mannsville	200	G 6
Eli	250	H 6	Furnace	75	K 5	Hebbardsville	238	C 5	Kirkmansville	138	C 6	Mariba	75	K 5
Elias		K 6	Gabbard		K 6	Hebron	250	J 1	Kirksey	182	D 3	Marion	2,375	A 6
Elihu		H 6	Gallup	100	M 4	Heidelberg		K 5	Kirkville	1,500	J 5	Marrowbone	250	F 7
Elizabethtown			Galamel	500	F 7	Heidrick	600	K 7	Kito		M 6	Marshes Siding		
	5,807	F 5	Gapcreek	300	H 7	Heisey	150	N 5	Kitts	1,431	L 7		500	H 7
Elizaville	150	K 4	Garfield	150	E 5	Hlechwawa	120	L 5	Knifey	225	G 6	Martha		M 4
Elk Creek	90	G 4	Garlin	75	G 6	Hellier	346	N 6	Knob Lick		F 6	Martin	1,170	M 5
Elk Horn		G 6	Garrett		M 6	Helton		L 7	Knottsville	250	D 5	Martinsburg		
Elkataka	250	K 5	Garrison	300	L 3	Henderson	16,837	B 5	Kona	400	M 6	(Sandy Hook)	238	L 4
Elkfork		L 5	Gatliff	500	K 7	Hendricks		L 5	Kosmosdale	375	E 4	Martwick	285	D 6
Elkhorn City			Gatton	101	F 6	Henshaw	210	B 5	Krypton	88	L 6	Mary	300	K 5
	1,349	N 6	Gausdale		J 7	Herndon	250	C 7	Kuttawa	794	E 3	Mason	75	H 3
Elkton	1,312	C 7	Geneva	195	B 5	Hesler		H 4	Kyrocker		E 6	Matthew		L 5
Elliotville	100	L 4	Georges Cr.	300	M 5	Hi Hat	650	M 6	La Center	593	C 3	Mattingly	40	D 5
Elmrock	276	L 6	Georgetown	5,516	H 4	Hibernia	100	G 6	La Fayette	246	B 7	Maud	53	G 5
Elrod	75	J 6	Germantown	260	K 3	Hickman	2,037	C 4	La Grange	1,558	G 4	Maurice		K 2
Elsmere	3,483	K 2	Gesling	100	L 4	Hickory	185	D 3	Lackey	452	*M 6	Mayfield	8,990	D 3
Elva	95	D 3	Gest	47	H 4	High Bridge	350	H 5	Lair	65	J 4	Mays Lick	400	K 3
Eminence	1,462	G 4	Ghent	368	G 3	Highland			Lake	250	K 6	Maysville	8,632	K 3
Emlyn	700	J 7	Gilbertsville	700	D 3	Heights	1,569	L 1	Lakeside Park	988	K 2	Maytown		K 5
Emma	600	M 5	Gimlet	100	L 4	Highsplint	1,500	L 7	Lamasco	100	B 7	McAfee	75	H 5
English	150	G 3	Girdler	500	K 7	Highway	100	G 7	Lambic	75	L 5	McAndrews		N 5
Ennis	612	D 6	Glasgow	7,025	E 6	Hillsboro	141	K 4	Lancaster	2,402	H 5	McCarr		N 5
Eolia	100	M 6	Glen Dean	100	E 5	Hima	200	K 6	Lanonia		K 2	McDaniels	75	E 5
Erlanger	3,694	K 2	Glen Springs	50	K 3	Himerville			Laurel Creek	300	K 6	McDowell	330	M 6
Essie		L 6	Glencoe	500	H 3	(Beauty)	577	N 5	Lawrenceburg			McHenry	511	D 6
Estill		M 6	Glendale	300	F 5	Himyar	400	K 7		2,369	H 4	McKee		K 6
Etoile	40	F 7	Glens Fork	213	G 6	Hindman	521	M 6	Lawton	375	L 4	McKinney	500	H 6
Etty	200	M 6	Glenwood		M 4	Hinton	125	J 4	Lebanon	4,640	G 5	McQuady	100	D 5
Eubank	322	H 6	Glo	500	M 6	Hiram	300	L 7	Lebanon Jct.	1,243	F 5	McRoberts	2,500	M 6
Everts	1,937	L 7	Glomawr	800	L 6	Hiseville		F 6	Lecta	50	F 6	McVeigh	1,292	N 5
Evelyn		K 5	Golden Pond	125	B 7	Hitchins	1,000	M 4	Lee	25	E 6	Meador	40	E 7
Ewing	400	K 4	Goodloe		M 5	Hodgenville	1,695	F 5	Lee City	120	L 5	Meally	500	M 5
Ezel		L 5	Gooseroock		K 6	Holland	120	E 7	Leeco	200	K 5	Means	75	K 5
Fagan	50	K 5	Goshen	100	F 4	Homer	58	D 7	Leighton	500	K 5	Meibor	227	D 3
Fairfield	202	*G 5	Gracey	230	B 7	Hope		K 4	Leitchfield	1,312	E 6	Melbourne	300	L 2
Fairplay	78	G 7	Gradyville	200	G 6	Hopewell	158	M 4	Lejunior		L 7	Mentor	250	J 3
Fairview		C 7	Graham	1,100	C 6	Hopkinsville			Leon	125	M 4	Merrimac	175	G 6
Falcon	300	L 5	Grahn	600	L 4		12,526	B 7	Levee		K 5	Meta	250	N 5
Falls of Rough			Grand Rivers	234	E 3	Horse Branch	225	D 6	Level Green	75	J 6	Mexico	300	E 2
Fallsburg	200	M 4	Grange City	225	K 4	Horse Cave	1,545	F 6	Lewisburg	496	C 6	Middleburg	250	H 6
Falmouth	2,186	J 3	Grant	100	H 3	Horton	30	D 5	Lewisport	656	D 5	Middlesboro		
Fancy Farm	419	C 3	Grassland	79	E 6	Howardstown	100	F 5	Lexington	55,534	J 4		14,482	K 7
Fariston	290	J 6	Graz	150	H 4	Howel	50	B 7	Liberty	1,291	H 6	Middletown	1,500	G 4
Farler	200	L 6	Gravel Switch	200	G 5	Huddy		N 5	Lida	200	K 6	Midway	950	H 4
Farmers		L 4	Gray	300	K 7	Hudson	133	E 5	Liggett	450	L 7	Midburn	300	O 3
Farmington	221	D 4	Gray Hawk	300	J 6	Huntersville	193	G 7	Ligon	396	M 6	Millford	150	J 3
Faubush	300	H 6	Graysbranch	156	M 3	Huntsville	140	D 6	Lily		J 6	Mill Springs	250	H 7
Fedscreek		N 6	Grayson	1,383	M 4	Hustonville	435	H 6	Limbaburg	45	J 2	Millard		N 6
Felty	200	K 6	Green Hall	120	K 6	Hyden	647	L 6	Linton	200	E 3	Millersburg	828	J 4
Ferguson	50	D 7	Greenmount	119	J 6	Isley	400	B 6	Linnwood		F 6	Millertown	80	E 6
Ferguson	550	H 6	Greensburg	1,032	F 6	Independence	285	H 3	Lisman	175	B 6	Mills	300	K 7
Field	300	K 7	Greenup	1,276	M 3	Indian Hills	291	*F 4	Littcarr		M 6	Millstone	700	M 6
Finchville	75	G 4	Greenwood	2,661	C 6	Inez	622	N 5	Livermore	1,441	C 5	Milltown	250	G 6
Finley	105	G 6	Greenwood	100	J 7	Irad		M 4	Livia	75	C 5	Millwood	175	E 6
Finney	75	E 7	Grove Center	200	B 5	Irvine	3,259	K 5	Livingston	378	J 6	Milo	174	M 5
Firebrick	150	L 3	Guage	50	L 5	Irvington	831	E 5	Lloyd	375	M 3	Milton	355	G 3
Fishtrap	1,000	N 6	Gulnare	150	M 5	Island	566	C 6	Lockport	102	H 4	Mima		L 5
Pitchburg	200	K 5	Gus		D 6	Isosville	150	L 4	Locust Branch	300	J 5	Minerva		K 3
Flat	200	K 5	Guston	108	E 5	Iuka	21	D 3	Locust Hill	50	E 5	Mitchellsburg	175	H 5
Flat Fork		L 5	Guthrie	1,253	C 7	Ivel		M 5	Logansport	125	D 6	Mockingbird		
Flat Lick	1,000	K 7	Guy		D 6	Ivis	1,200	M 6	Lola	150	D 2	Valley	150	*F 4
Flat Rock		H 7	Haddix	500	L 6	Ivyton	300	L 5	London	3,426	J 6	Moct		L 5
Flatgap	130	M 5	Hadensville	85	C 7	Jackson	1,978	L 5	Lone Oak	1,250	D 3	Monterey	215	H 4
Fleming	943	M 6	Hadley	675	D 6	Jamestown	1,084	G 7	Lookout	1,300	N 6	Monticello	2,934	H 7
Flemingsburg			Haldeman		L 4	Jason	250	K 6	Lookout Hts.	603	K 1	Mooleyville	50	D 4
	1,502	K 4	Haleys Mill	20	C 6	Jeff	1,500	L 6	Loretto	600	G 5	Moorefield	150	K 4
Flint	100	M 6	Halfway	200	E 7	Jeffersonstown			Lost Creek	250	L 6	Moore's Creek	214	K 6
Flippin	150	F 7	Hall		M 6		1,246	G 4	Lothair	1,313	L 6	Moorman	300	C 6
Florence	1,325	J 2	Hamilton	25	H 3	Jeffersonville	479	K 5	Louellen	1,600	L 7	Moree	250	N 5
Fonde	1,300	K 7	Hamlin	20	E 4	Jellico Creek		J 7	Louisa	2,015	M 4	Morehead	3,102	L 4
Fonthill	50	H 6	Hammond	400	K 7	Jenkins	6,921	M 6	Louisville	369,129	F 4	Morganland	500	H 6
Ford	250	J 5	Hampton	120	D 2	Jericho	110	G 4	Lovelaceville	275	C 3	Morgan	80	J 3
Fordsville	533	D 5	Hanson	393	C 6	Jerial	175	M 4	Lovely	500	N 5	Morganfield	3,257	B 5
Forks of Elkhorn			Happy	800	L 6	Jett	240	H 4	Loves	150	C 3	Morgantown	850	D 6
Fort Knox	10,000	F 5	Hardburly	800	L 6	Jetts Creek	75	K 6	Lowmansville	500	M 5	Morning View	143	J 3
Fort Mitchell	372	K 1	Hardin	324	D 3	Johnetta	100	J 6	Loyal	1,548	L 7	Morris Fork	250	K 6
Fort Thomas	10,870	L 1	Hardin Sprs.	112	E 5	Jonesville	158	H 3	Lucas	75	F 7	Mortons Gap		
Fort Wright	594	*K 2	Hardinsburg	902	D 5	Joy	70	D 2	Lucile		L 4		1,081	B 6
Foster	108	J 3	Hardshell	50	L 6	Junction City	988	H 5	Ludlow	6,374	K 1	Moscow		C 4
Fountain Run	218	F 7	Hardy		N 5	Kayjay	350	K 7	Lynch	3,970	M 7	Mount Eden	300	G 4
Francisville	25	J 1	Hardyville	300	F 6	Keaton		L 5	Lynn Grove	75	D 4	Mount Olivet	455	J 3
FRANKFORT			Harlan	4,786	L 7	Keavy		J 6	Lynnville	100	D 4	Mount Salem	200	H 6
	11,916	H 4	Harned	140	E 5	Keene	500	H 5	Lyons		F 5	Mt. Sherman	150	F 6
Franklin	4,343	D 7	Harold	500	M 5	Kehoe	175	L 4	Mac		G 6	Mt. Sterling	5,294	J 4
Fredonia	395	B 6	Harrods Creek		F 4	Kelly	90	C 7	Maceo	350	D 5	Mt. Vernon	1,106	J 6
Freeburn	2,200	N 5	Harrodsburg	5,262	H 5	Keltner		F 6	Mackville	250	G 5	Mt. Washington		
Freedom	75	F 7	Hartford	1,564	D 6	Kemp		F 6	Macon		E 6		40	F 4
Frenchburg	268	K 5	Harveyton	368	L 6	Kenton (Kentonvale)			Madisonville			Mountain Ash		
Frew	162	L 6	Hatcher		G 6		165	J 3		11,132	B 6		475	J 7
			Hatfield	250	N 5	Kenvir	3,250	L 7	Majestic	1,140	N 5	Mouthcard	400	N 6
			Hawesville	925	D 5	Kevil	202	C 3	Malone	260	L 5	Muir	400	J 4

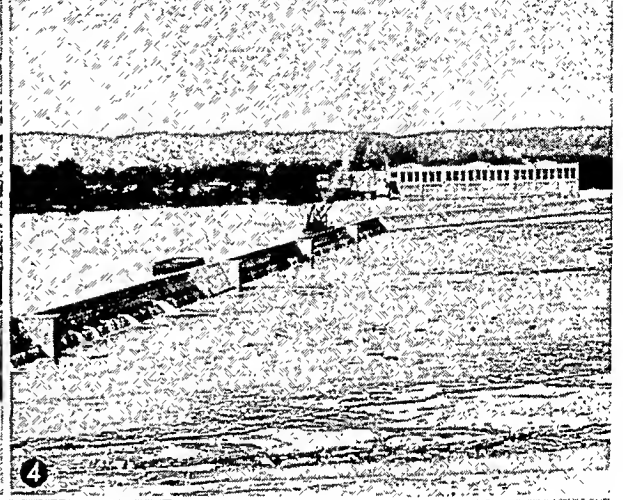
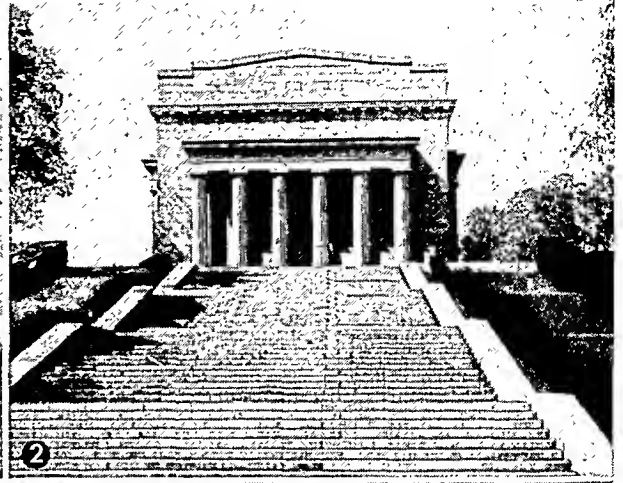
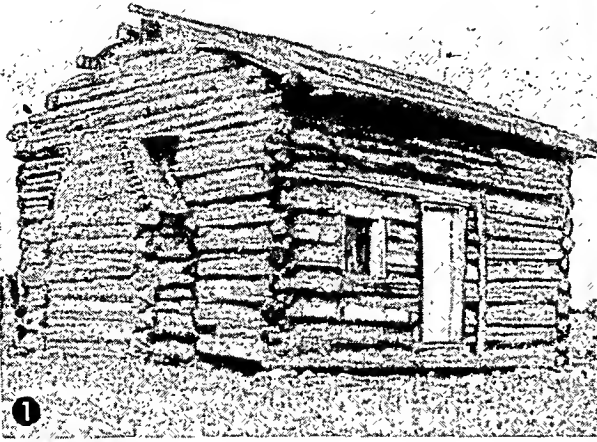
*No room on map for name.

KENTUCKY—Continued

Muldraugh	1,100	E 5	Pierce	300	F 6	Saint Francis	248	G 5	Staffordsville	350	M 5	Walker	400	K 7
Munfordville	894	F 6	Pigeonroost	250	K 6	Saint Helens	300	K 5	Stamping			Wallington	200	K 4
Murl	400	H 7	Pike View		F 6	Saint Joseph		O 5	Ground	396	H 4	Wallins Creek	525	K 4
Murray	6,035	D 4	Pikeville	5,154	N 6	Saint Mary	212	G 5	Stanford	1,861	H 5	Wallonia	160	B 7
Myers	150	K 4	Pilgrim		N 5	Saint Matthews			Stanley		C 5	Wallsend		K 7
Nancy	500	H 6	Pilot	150	K 5	Saldee	75	F 4	Stanton	635	K 5	Walnut Grove		H 6
Naomi		H 6	Pine Grove	100	J 5	Salem	395	D 2	State Line	200	C 4	Waltersville	250	J 5
Napier		L 7	Pine Hill	500	J 6	Salmons	35	D 7	Station Camp	300	J 5	Walton	1,358	H 3
Narrows	100	D 5	Pine Knot	1,500	H 7	Saloma	168	G 6	Stearns	3,000	J 7	Warfield	324	N 5
Nebo	282	B 6	Pineville	3,890	K 7	Salt Lick	488	K 4	Stephensburg	200	E 5	Warnock	175	M 4
Ned	276	L 6	Pittsburg	800	J 6	Salvisa	500	H 5	Stephensport	155	D 5	Warsaw	829	H 3
Nelse	100	M 6	Place	600	J 7	Salversville	1,174	L 5	Stepstone		K 4	Washington	500	K 3
Nelson		C 6	Pleasant View			Samuels	250	G 5	Stillwater	800	K 5	Watauga	100	G 7
Nelsonville	50	F 5		500	J 7	Sand Springs	100	J 6	Stone		N 5	Water Valley	346	C 4
Neon	1,055	M 6	Pleasureville	355	G 4	Sanders	206	H 3	Strathmoor			Watertown		M 5
Nepton	225	K 4	Plummers			Sandgap	800	J 6	Gardens	329	*F 4	Waterview	250	G 7
Nevisdale		J 7	Landing	100	L 4	Sandy Hook	238	L 4	Stratbmoor			Waverly	345	B 5
New Castle	631	G 4	Polsgrove	44	H 4	Sano	225	G 6	Manor	422	*F 4	Waverly Hills	600	F 4
New Concord	50	E 4	Poole	250	B 5	Sardis	176	K 3	Strathmoor			Wax	123	E 6
New Haven	563	F 5	Poplarville		J 6	Savoy	350	J 7	Village	466	*F 4	Wayland	1,807	M 6
New Hope	350	G 5	Port Royal	156	G 3	Sawyer	462	J 7	Stricklett	25	L 4	Waynesburg	400	H 6
New Liberty	225	H 3	Portland	200	G 6	Saxton	200	J 7	Strunk	250	J 7	Webbs Cross		
Newfoundland	60	L 4	Powersburg	400	H 7	Scalf	500	K 7	Sturgis	2,222	B 5	Roads	300	G 6
Newman		C 5	Preece		M 5	Science Hill	445	H 6	Sublett	250	L 5	Webbville	200	M 4
Newport	31,044	L 1	Premium	500	M 6	Scottsburg	50	E 3	Subtle	25	G 7	Webster	128	E 5
Newtown	100	J 4	Preston	200	K 4	Scottsville	2,060	E 7	Sudith	120	K 4	Weeksbury	1,340	M 6
Nicholasville	3,406	J 5	Prestonsburg			Scranton	50	K 5	Sullivan	250	A 6	Wellington	300	K 5
Nick		E 6		3,585	M 5	Seabee	1,158	B 5	Sulphur	350	G 4	Wellington	656	*F 4
Noctor	200	L 5	Prestonville	166	G 3	Seco	644	M 6	Sulphur Lick	75	F 7	W. Irvine	200	J 5
Nolin	75	F 5	Priceville		F 6	Sedalia	240	D 4	Sulphur Well		F 6	W. Liberty	931	L 5
Norfleet	150	H 6	Pride	150	E 2	Seneca Gardens			Summer Shade	350	F 7	W. Louisville	250	C 5
Normandy	75	G 4	Princeton	5,388	B 6	Seneca Vista	363	*F 4	Summersville	500	F 6	W. Paducah	135	C 3
N. Corbin	1,077	J 7	Prospect	300	F 4	Sewell	200	L 5	Sumner	50	J 7	W. Point	1,669	E 4
N. Middletown		J 4	Providence	3,905	B 6	Sextons Cr.	250	K 6	Sunnydale	75	D 5	W. Russell	1,200	M 4
N. Pleasureville	319	J 4	Pryorsburg	400	D 3	Sbady Grove	60	B 6	Susie	400	H 7	W. Somerset	500	H 6
			Pryse	200	K 5	Sharon Grove	200	D 7	Sweden	130	E 6	West Van Lear		M 5
			Pulaski	80	H 6	Sharpsburg	405	K 4	Switzer	246	H 4	Westend	250	J 5
Northfield	198	G 4	Pyramid		M 5	Shawban	100	J 4	Talbert	25	L 6	Westport	125	F 4
Nortonville	60	J 6	Quality	55	D 6	Shelbiana	500	M 6	Tateville	500	H 7	Westwood	4,000	M 4
Nuckols	103	C 5	Quicksand	350	L 5	Sbelbyville	4,403	G 4	Tateville	500	H 7	Westwood	4,000	M 4
O'Bannon	1,500	G 4	Quincy	200	L 3	Shepherdsville	953	F 4	Tateville	500	H 7	Westwood	4,000	M 4
Oak Grove		C 7	Quinton	250	H 7	Sherburne	100	K 4	Tateville	500	H 7	Westwood	4,000	M 4
Oakland	195	E 6	Raceland	1,001	M 3	Sherman	160	H 3	Tateville	500	H 7	Westwood	4,000	M 4
Oakton	240	C 4	Ransom		N 5	Sibly	2,401	F 4	Tateville	500	H 7	Westwood	4,000	M 4
Oakville	200	D 7	Ravenna	979	K 5	Sibert	250	K 6	Tateville	500	H 7	Westwood	4,000	M 4
Offutt	210	M 5	Raywick	175	G 5	Sildaway	65	L 4	Tateville	500	H 7	Westwood	4,000	M 4
Ogle	150	K 6	Ready	175	E 6	Silloom	350	M 3	Tateville	500	H 7	Westwood	4,000	M 4
Oil Springs		L 5	Redbusb		L 5	Silver Grove	1,000	L 2	Tateville	500	H 7	Westwood	4,000	M 4
Okolona	1,047	F 4	Redbouse	500	J 5	Silverhill	500	L 5	Tateville	500	H 7	Westwood	4,000	M 4
Old Landing	250	K 5	Redwine	138	L 4	Simpson		L 5	Tateville	500	H 7	Westwood	4,000	M 4
Oldtown	110	M 4	Reed	155	C 5	Simpsonville	247	G 4	Tateville	500	H 7	Westwood	4,000	M 4
Olin	196	J 6	Reedyville	50	D 6	Sizerock	200	L 6	Tateville	500	H 7	Westwood	4,000	M 4
Olive Hill	1,351	L 4	Relief	350	L 5	Skaggs	171	L 4	Tateville	500	H 7	Westwood	4,000	M 4
Olmsstead	100	D 7	Repton	36	E 2	Slade	500	K 5	Tateville	500	H 7	Westwood	4,000	M 4
Olney	75	E 2	Revelo		J 7	Slaughters	326	B 6	Tateville	500	H 7	Westwood	4,000	M 4
Olympia	250	K 4	Rexon	20	L 3	Sleep	150	L 6	Tateville	500	H 7	Westwood	4,000	M 4
Omer		L 5	Reynolds Sta.	30	D 5	Slickford	450	H 7	Tateville	500	H 7	Westwood	4,000	M 4
Oneida		K 6	Ricetown		K 6	Sloans Valley	225	J 7	Tateville	500	H 7	Westwood	4,000	M 4
Onton	125	C 5	Richardson	175	M 5	Smilax	200	L 6	Tateville	500	H 7	Westwood	4,000	M 4
Oppy		N 5	Richardsville	250	E 6	Smith Mills	300	B 5	Tateville	500	H 7	Westwood	4,000	M 4
Ordinary	100	L 4	Richelieu		D 7	Smith Town	600	H 7	Tateville	500	H 7	Westwood	4,000	M 4
Orlando	150	J 6	Richlawn	655	*F 4	Smithfield	121	*G 4	Tateville	500	H 7	Westwood	4,000	M 4
Orville	120	H 4	Richmond			Smithland	498	D 3	Tateville	500	H 7	Westwood	4,000	M 4
Outwood	500	B 6				Smiths Grove	683	E 6	Tateville	500	H 7	Westwood	4,000	M 4
Owensboro	33,651	C 5	Riley	350	G 5	Smoky Valley	100	L 4	Tateville	500	H 7	Westwood	4,000	M 4
Owenton	1,249	H 3	Rineyville	300	F 5	Soft Shell	248	M 6	Tateville	500	H 7	Westwood	4,000	M 4
Owingsville	929	K 4	Ritner	200	H 7	Soldier	150	L 4	Tateville	500	H 7	Westwood	4,000	M 4
Packard		J 7	Riverside	108	E 6	Somerset	7,097	J 6	Tateville	500	H 7	Westwood	4,000	M 4
Pactolus	150	L 4	Roark	100	L 6	Sophie	292	F 5	Tateville	500	H 7	Westwood	4,000	M 4
Paducah	32,828	D 3	Robards	428	B 5	South	57	E 6	Tateville	500	H 7	Westwood	4,000	M 4
Paint Lick	200	J 5	Roberta	5	E 4	S. Carrollton	289	C 6	Tateville	500	H 7	Westwood	4,000	M 4
Painville	4,309	M 5	Robinson	60	J 4	S. Ft. Mitchell			Tateville	500	H 7	Westwood	4,000	M 4
Palmer	150	J 5	Robinson Cr		N 6	South Hills	3,142	K 2	Tateville	500	H 7	Westwood	4,000	M 4
Panola	200	J 5	Rochester	372	D 6	S. Irvine	412	*K 2	Tateville	500	H 7	Westwood	4,000	M 4
Paris	6,912	J 4	Rockfield	150	E 7	S. Pleasureville (Plea-	355	G 4	Tateville	500	H 7	Westwood	4,000	M 4
Park City	448	E 6	Rockholds	562	J 7	S. Portsmouth			Tateville	500	H 7	Westwood	4,000	M 4
Park Hills	2,577	K 1	Rockport	450	D 6	S. Shore	1,196	L 3	Tateville	500	H 7	Westwood	4,000	M 4
Parkers Lake	100	H 7	Rockvale	25	D 5	S. Union	85	D 7	Tateville	500	H 7	Westwood	4,000	M 4
Parksville	200	H 5	Rocky Hill		E 6	Southgate	1,903	L 1	Tateville	500	H 7	Westwood	4,000	M 4
Parkway Village			Rose Hill	200	H 5	Sparksville	250	G 6	Tateville	500	H 7	Westwood	4,000	M 4
	1,036	*F 4	Rosewood	119	C 6	Sparrow	75	G 5	Tateville	500	H 7	Westwood	4,000	M 4
Patesville	75	D 5	Rosine	450	D 6	Spider	211	M 6	Tateville	500	H 7	Westwood	4,000	M 4
Payneville	81	E 5	Rowena	75	G 7	Spottsville	400	C 5	Tateville	500	H 7	Westwood	4,000	M 4
Peabody	20	K 6	Rowland	200	H 5	Spring Creek	27	K 6	Tateville	500	H 7	Westwood	4,000	M 4
Pebworth		K 5	Rowletts		F 6	Spring Lick	140	D 6	Tateville	500	H 7	Westwood	4,000	M 4
Pellville	111	D 5	Royalton	400	M 5	Springdale	30	K 3	Tateville	500	H 7	Westwood	4,000	M 4
Pembroke	532	C 7	Rugless	25	L 3	Springfield	2,032	G 5	Tateville	500	H 7	Westwood	4,000	M 4
Penrod	90	C 6	Rumsey	301	C 5	Sprule	200	K 7	Tateville	500	H 7	Westwood	4,000	M 4
Peoples	200	J 6	Rush	500	M 4	Spurrier	25	F 6	Tateville	500	H 7	Westwood	4,000	M 4
Perryville	660	H 5	Russell	1,681	M 3	Stab	200	J 6	Tateville	500	H 7	Westwood	4,000	M 4
Petersburg	356	H 2	Russell Springs						Tateville	500	H 7	Westwood	4,000	M 4
Petersville	150	L 4		1,125	G 6				Tateville	500	H 7	Westwood	4,000	M 4
Petroleum	175	E 7	Russellville	4,529	D 7				Tateville	500	H 7	Westwood	4,000	M 4
Pewee Valley	687	G 4	Ruth		J 6				Tateville	500	H 7	Westwood	4,000	M 4
Phelps	926	N 6	Sacramento	378	C 6				Tateville	500	H 7	Westwood	4,000	M 4
Phil	100	H 6	Sadleville	355	H 4				Tateville	500	H 7	Westwood	4,000	M 4
Philpot	109	D 5	Saint Charles	534	B 6				Tateville	500	H 7	Westwood	4,000	M 4

*No room on map for name.

KENTUCKY BLENDS TODAY WITH YESTERDAY



1. This old log cabin was the birthplace of Abraham Lincoln. 2. A beautiful marble and granite memorial building near Hodgenville now houses the Lincoln cabin. 3. In "My Old Kentucky Home" near Bardstown, Stephen Foster is believed to have written the beloved state song. 4. A hydroelectric plant at the Falls of the Ohio generates power for Louisville. 5. On the Louisville waterfront, paddle-wheel boats recall the days when the river trade brought the city its first era of prosperity.

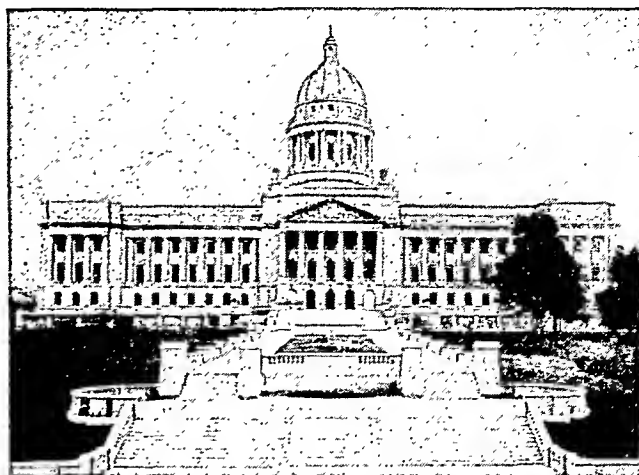
By 1774 several settlements had been made. In 1775 the Transylvania Company commissioned Daniel Boone to lead pioneers into this "second paradise." They blazed the Wilderness Trail from Cumberland Gap to Boonsboro. Stations were founded at Harrodsburg, Boiling Springs, and St. Asaph, or Logan's Station.

Kentucky was part of Virginia according to the English charter of 1609. Virginia refused to recognize Richard Henderson's claims for the Transylvania Company. In 1776 Virginia organized Kentucky County. Three years later George Rogers Clark reduced the possibility of English and Indian attacks by capturing Vincennes (*see* Clark). The last Indian battle in Kentucky was at Blue Licks in 1782. The Kentuckians became dissatisfied with control by Virginia and held a number of conventions to demand statehood. Kentucky became a state June 1, 1792.

Progress as a State

The legislature, under the influence of John Breckinridge as spokesman of the New West, passed the Kentucky Resolutions written by Thomas Jefferson in 1798 (*see* Jefferson). A little later Kentucky's brilliant representative, Henry Clay, became the great compromiser between the free North and the slave South (*see* Clay, Henry; Compromise of 1850).

When the Civil War threatened, John C. Breckinridge, John J. Crittenden, and Gov. Beriah Magoffin sought to prevent it by compromise and to hold Kentucky neutral. The Crittenden Compromise proposed to prohibit slavery north of 36°30' and protect South-



KENTUCKY'S MAJESTIC CAPITOL

Overlooking the Kentucky River in Frankfort is the new Capitol. This gleaming white building is made of Bedford limestone.

ern slaveholders. Torn in interests, Kentucky sent 80,000 men from the mountains to Lincoln and 40,000 from the Bluegrass to the Confederacy.

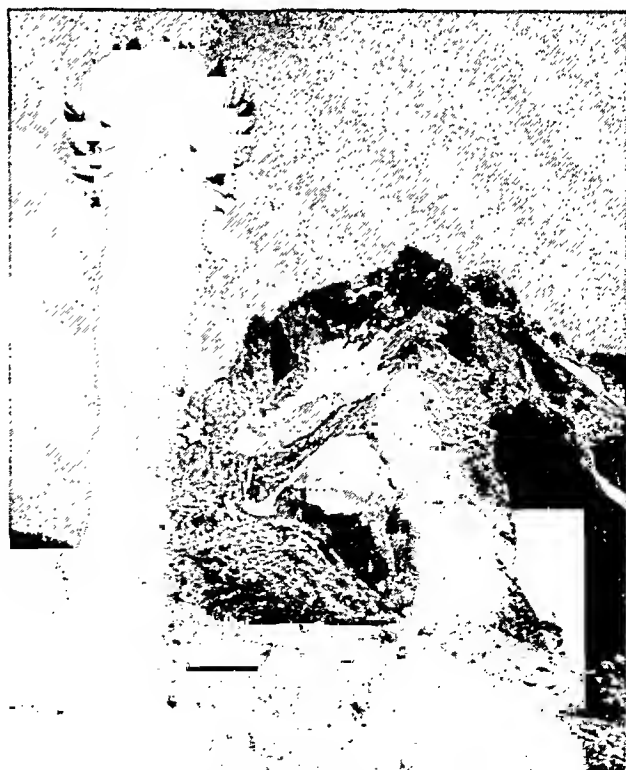
After the reconstruction period, the state developed its agriculture and industries. In the 20th century, an outstanding accomplishment was road building. Kentucky also harnessed its rivers with such projects as Dix River Dam, the great Kentucky Dam of the Tennessee Valley Authority on the Tennessee, Wolf Creek Dam on the Cumberland, and Dewey Dam on Johns Creek. (*See also* chronology in Kentucky Fact Summary; United States, section "The South.")

KENYA—BRITAIN'S *Turbulent* COLONY

KENYA. The British East African colony and protectorate of Kenya is named for the great snow-capped mountain that dominates the land. Kenya is on the Indian Ocean and is divided almost in the center by the equator (for maps, *see* Africa; East Africa, British).



The protectorate is a strip of coastal land ten miles wide. It extends from the border of Tanganyika north to the Tana River and includes the islands of the Lamu Archipelago. The protectorate is leased from the Sultan of Zanzibar and is administered as part of Kenya Colony. Kenya, with an area of 224,960 square miles, is somewhat smaller than Texas. In 1948 the population was 5,410,281, including about 50,000 Asiatics (Indians



Mount Kenya's snow and glaciers are almost on the equator. Africa's second highest mountain looms behind a tropical lobelia.

and Arabs) and 17,000 whites of European descent.

Land and Climate

Kenya lies on the East African plateau. In the west the plateau is split from north to south by a rift valley. Africa's highest mountains rise from the sides of the rift: Mount Kenya (17,040 ft.); Mount Elgon (14,136 ft.); and just across the Tanganyika border, Mount Kilimanjaro (19,319 ft.). Most of the mountain slopes and the walls of the rift are thickly wooded. (See also Africa, subhead "The Great Rift Valley"; East Africa, British.)

Most of Kenya north of the equator has little rain. It is an arid waste of dry grasses, scrub, thorn, and acacia trees. This region is a hunter's paradise—a land of lions, zebras, elephants, giraffes, antelopes, and other game animals. (See also Grasslands; for pictures in color, see Africa.)

The highlands of southwest Kenya are sometimes called the "white man's country." The days are warm and sunny and the nights are cool. The highlands get about the same amount of rain as the Midwestern United States. The soil is volcanic, usually deep and rich. It is some of the best farm land in all Africa.

The western slopes of the highlands are grassland called savanna. The land descends gradually to the level of Lake Victoria (for picture, see Africa). East of the highlands it drops to the Indian Ocean coast. The climate in the lowlands ranges from tropical to subtropical. Malaria and the tsetse fly make it unhealthy for white settlers.

The Native Tribes of Kenya

There are more than a hundred tribes in Kenya. The principal tribes are the Masai and the Kikuyu.

The Masai are a nomadic pastoral people of mixed Hamitic and Negro blood (see map "Races of Africa" and picture in the Africa article). They are handsome, proud, and aggressive. Their living depends upon their all-important cattle. Masai villages are built around a cattle enclosure called a kraal. For protection from lions the huts are covered with branches from thorn



A BRITISH COLONIST'S FARMHOUSE IN KENYA

Compare this house with the Kikuyu huts in the picture below. Notice how British settlers in Kenya have combined English and African building styles.



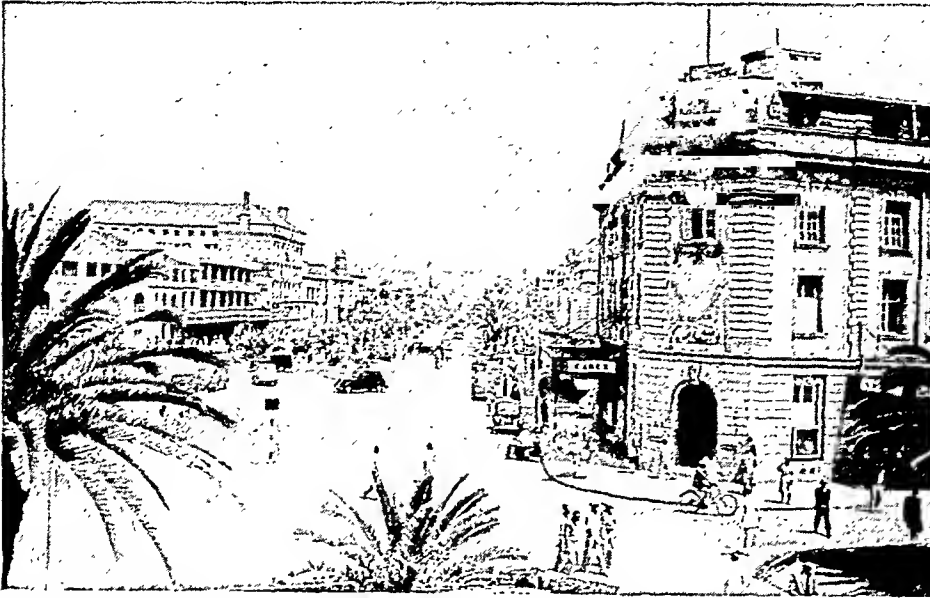
KIKUYU HUTS HAVE THATCH AND CEDAR POLES

These Kikuyu are "squatters" on the European farm shown above. They are permitted

to build their huts there in exchange for working part of the year for a small wage.

bushes and trees. When the herds are put out to pasture they are guarded by young Masai warriors. The Masai live mostly on the milk and blood of the cattle. Their scanty leather clothing is made of cured cattle hides. When a Masai warrior dies his cattle go to the eldest son of his first wife.

The Kikuyu are a Negroid, Bantu-speaking people. Most of them are farmers. For years they cultivated the rich soil of the highlands. Then the white men came. Gradually they obtained the fertile lands of the Kikuyu—sometimes honestly, sometimes not. The Kikuyu were crowded into areas where the soil was poor. Their tribal system began to break down. They looked with envy on the large, fertile farms of the white settlers. Gradually the resentment of the Ki-



KENYA'S CAPITAL

Nairobi, more than 5,000 feet above sea level, has one of the finest climates in East Africa. Many big-game expeditions start here.

kuyu grew and finally exploded in the violent murders and terror of the Mau Mau secret society. The Mau Mau were determined to drive the whites from Kenya.

Arabs and Asian Indians

The Arabs and Indians are a minority group. Most of them live in the coastal region, particularly in and around the ancient port of Mombasa (84,746). Many of these people are descended from traders who came to Kenya's coast centuries ago. They are most active in the commercial life of the colony.

The White Settlers

Kenya has more British settlers than any other part of the continent except the Union of South Africa. Almost all of them live in the cool highlands. Parts of the highlands look like the English countryside. There are country estates with pink brick manor houses set in green parks. There are farms with rolling meadows where sheep and cattle graze. In contrast, antelope, giraffes, and other wild animals roam in the savannas and forests of the highlands.

Nairobi (118,976), the capital, is one of the most cosmopolitan cities in Africa. In many ways it is like London and New York City. It is also an interesting mixture of East and West. A tall, modern apartment house may tower over the dome and minaret of a Moslem mosque. Nairobi's suburban houses have gardens of hollyhocks and other English flowers.

White Kenya, peaceful on the surface, faces the growing wave of African nationalism. Many farms are fortified against a surprise Mau Mau attack. White men and women go armed at night, even in parts of the capital. Kenya is an uneasy land.

Agriculture, Forestry, and Mining

The wide range of climate provides a variety of crops. In the temperate to semitropical highlands the

major crops are wheat, maize (corn), tea, coffee, and pyrethrum. The dairy and wool industries are important. The tropical lowlands produce sisal, cotton, coconuts, and pineapples. Rice and tobacco are grown in the Lake Victoria region.

Forests are divided into two zones: highland and tropical coast. Valuable highland trees are the pencil cedar, African camphor, African olive, and podo (widely used for lumber). The coast produces the aromatic muhugu (exported to India as a substitute for sandalwood), mangroves, and others.

Mineral resources are not fully explored. The most important are salt, soda ash, gold, asbestos, manganese, graphite, gypsum, and diatomite.

Trade, Transportation, and Communication

The principal exports are coffee, tea, sisal, cattle hides, and pyrethrum. The chief imports are cotton piece goods and blankets, gasoline, kerosene, iron and steel, machinery, electrical equipment, and motor vehicles.

There are more than 20,000 miles of roads varying from all-weather, hard surfaces to faint tracks in remote areas. The main railway runs from Mombasa to Nairobi and goes on to Kampala in Uganda. Nairobi is an important air center served by East African and British Overseas Airways. There is steamer service on Lake Victoria. Nairobi's radio station maintains a local broadcasting service.

History

Arabs and then Portuguese first settled Kenya's coast. In the 19th century, Britain gained commercial control through the British East Africa Company. A protectorate was established in 1890 and the colony in 1895. After Lord Delamere arrived in 1897, emigrants began to flow in from the British Isles and South Africa.

Kenya has a governor appointed by the crown and a legislative council. Missionaries controlled almost all education until recently when the government began to establish new schools and subsidize the missions. (For picture of a mission school, see Africa.)

KEPLER, Johannes (1571-1630). The German duchy of Württemberg was Kepler's birthplace. He was a sickly child but had a brilliant mind. At the University of Tübingen he was greatly influenced by the theories of the astronomer Copernicus (see Copernicus). He later taught astronomy and mathematics at the university in Graz, Austria. While there he cor-

responded with two other great astronomers of the time—Galileo and Tycho Brahe. In 1600 he became Tycho's assistant in Prague. When Tycho died Kepler succeeded him as astrologer and astronomer to Rudolph II of Bohemia. His task of casting horoscopes at births and other important events in the royal family was of first importance; astronomy was secondary. Kepler, however, gave all the time he could to the outstanding astronomical problem of the day.

By Kepler's time, many astronomers believed that the sun was the center of the solar system and that the earth turned on its axis. These astronomers, however, still believed that the planets moved in circular orbits. Because of this, they failed completely when it came to explaining the motions of the planets as seen from the earth. Mercury and Venus stand higher in the evening or morning sky, then lower, but always near the sun. Mars, Jupiter, and Saturn, on the other hand, move eastward night after night against the background of stars but occasionally shift backward (retrogress to the west).

Kepler decided to try explaining these motions by finding another shape for the planetary orbits. Because Mars offered the most typical problem and he had Tycho's lifelong, accurate observations of this planet, Kepler began with it. He first tried every possible combination of circular motions in attempts to account for Mars's observed positions. These all failed, though once a discrepancy of only eight minutes of arc remained unaccounted for. "Out of these eight minutes," he said, "we will construct a new theory that will explain the motions of all the planets!"

After six years of incredibly laborious work, hampered by poor eyesight and the clumsy mathematical methods of the day, he found the answer. Mars follows an elliptical (oval) orbit at a speed which varies according to the planet's distance from the sun. In 1609 he published a book on the results of his work, boldly titling it "The New Astronomy".

Next he turned his attention to the other planets and found that their motions corresponded to those of Mars. He also discovered that their periods of revolution (time required to go around the sun) bore a precise relation to their distances from the sun.

Kepler's great work on planetary motion is summed up in three principles which have been known since his day as "Kepler's laws":

1. The path of every planet in its motion about the sun forms an ellipse, with the sun at one focus.

2. The speed of a planet in its orbit varies so that a line joining it with the sun sweeps over equal areas in equal times.

3. The squares of the planets' periods of revolution are proportional to the cubes of the planets' mean distances from the sun.

These laws removed all doubt that the earth and planets go around the sun. Later Newton used Kepler's laws to establish his law of universal gravitation (see Newton).

Kepler could now proceed with his task of revising the Rudolphine tables, an almanac of stellar positions

which, although unsatisfactory, was the best available at the time. Kepler's new laws enabled him to predict positions of the planets by date and hour that have proved to be substantially accurate even to our day.

Kepler was one of the first to hear from Galileo about the invention of the telescope, and he went on to do valuable pioneer work in optics. It was he who invented the present-day form of astronomical telescope (see Telescope). His book on optics, 'Dioptrice', published in 1611, was the first of its kind and founded the scientific study of light and lenses.

KEY, Francis Scott

(1779-1843). The man who composed the stirring words of the 'Star-Spangled Banner' was a lawyer who wrote verses only as a hobby. He might be forgotten now if he had not seen the American flag flying over besieged Fort McHenry in the War of 1812. How this sight inspired him to write the verses is told in the article National Songs.



Francis Scott Key was born on his family's estate, Terra Rubra, in western Maryland. His birth date is usually given as Aug. 1, 1779, although some family records have it as Aug. 9, 1780. At Terra Rubra young Francis learned to ride, shoot, and fish. In 1791 he heard George Washington speak from the portico of Terra Rubra.

Until Francis was ten, he was taught at home. After attending preparatory school at Annapolis he entered St. John's College. Key went on to prepare himself for a legal career in the office of Judge Jeremiah Chase. A fellow student there was Roger Brooke Taney, who later became the chief justice of the Supreme Court.

He was 18 when he met Mary Tayloe Lloyd, then only 14. Their affection grew and in 1802 they were married. They had 11 children—six sons and five daughters. Soon after their wedding the Keys moved to Georgetown, then just outside Washington, D.C. In Georgetown his law practice prospered and he met many government leaders. Taney, who had married Key's sister Ann, and John Randolph of Roanoke were constant visitors. A devout man, Key once thought seriously of becoming a clergyman. He was a lay reader and a delegate to Episcopal church conventions.

Key served briefly in the War of 1812 but was a civilian again when he wrote the 'Star-Spangled Banner'. He was active in the American Colonization Society, which helped free Negroes to settle in Liberia. In 1833 President Jackson appointed him attorney for the District of Columbia. Still active at 63, he was visiting his daughter in Baltimore when he caught cold and died of pleurisy Jan. 11, 1843.

KEY WEST, FLA. Some 60 miles southwest of the tip of Florida's mainland, the island of Key West rises about six feet above the ocean. The island is only four miles long and less than two miles wide; but on it stands the city of Key West, the southernmost city in the United States.

The location (latitude 24° 33' north) is in line with the central Sahara Desert. But surrounding waters make the climate agreeable. Sunny, frost-free days the year round, tropical trees and flowers, weathered wooden houses, Latin-American coffee shops, and picturesque fishing smacks and schooners give Key West colorful charm.

A settlement on the island was incorporated as a city in 1828. Cuban cigar makers built a prosperous industry after 1869. During the 1890's Key West was Florida's largest city, with a population of about 18,000. But soon the cigar-making and sponge-fishing industries moved away from the city. Today the United States Naval Base, tourist trade, and fishing provide the greatest employment. Shrimp are caught in the Gulf of Mexico. Giant sea crawfish are sold on the mainland as "Florida lobsters," and sea turtles are turned into green turtle soup in Key West's cannery.

Development of Key West

Key West is the westernmost in a chain of islands called the Florida Keys. The entire chain was connected with the mainland in 1912 by a railroad built along the keys. It was abandoned when many of the bridges and viaducts between the islands were destroyed by a hurricane in 1935. The Federal government used most of the old railway road-bed and concrete arched bridges to build the Overseas Highway, 156 miles long from Miami to Key West. This highway opened in 1938. Today bus service links the two cities. Air lines operate from Meacham Field, the city airport, to Miami and Havana, Cuba, less than a hundred miles away.

TWO OF FLORIDA'S THOUSANDS OF KEYS



The top picture shows one of the islands called keys that lie off Florida between the Gulf of Mexico (left) and the Atlantic Ocean (right). The view is from a bridge at Bahia Honda. At the western end of the chain of keys, is the city of Key West (bottom). The Overseas Highway links this city to the mainland.

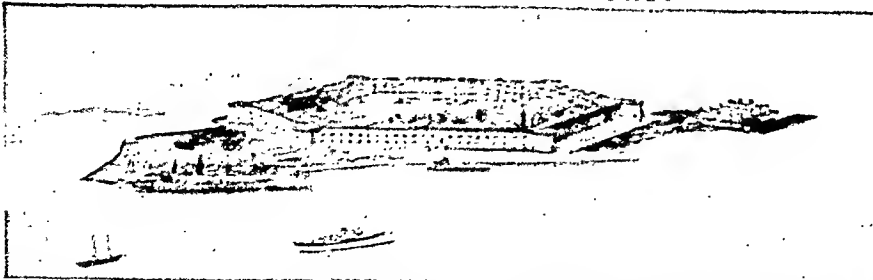
The government also built an aqueduct about 130 miles long to bring fresh water from the mainland. Until then, Key West had relied largely upon rain water. During the first and second World Wars, naval and air bases were established at Key West to

guard the entrance to the Gulf of Mexico. Population (1950 census), 26,433.

The Florida Keys

The many small islands off the Florida coast are commonly called "keys," from the Spanish word *cayo*. It means "rock" or "islet." The name Florida Keys is usually restricted to the chain of about 60 islands which extends 150 miles from Miami Beach to Key West

A GRIM FORTRESS OF THE PAST



Fort Jefferson National Monument was a Civil War fortress and a prison. It stands on Garden Key, one of the Dry Tortugas which lie in the Gulf of Mexico, 60 miles from Key West.

The northern end of the chain is a remnant of an old coral reef. Living corals are still building reefs here. The Lower Keys, at the southern end, are fragments of a limestone island. The largest of this group is Key Largo. It is about 30 miles long and less than two miles wide. Some of the larger keys have fruit groves and tourist fishing camps. Many small ones are submerged at high tide.

Sixty miles west of Key West lies a group of ten coral keys called the Dry Tortugas. A massive brick fort on Garden Key served as a federal prison during the Civil War. Now it is preserved as Fort Jefferson National Monument. On Loggerhead Key in the Tortugas is a marine laboratory.

KHARKOV (*kār'kôf*). In southern Russia, "all roads lead to Kharkov." From its earliest days as a fort in the 17th century down through the second World War, Kharkov has been repeatedly ravaged by war. But each time a new city was erected and Kharkov became one of the largest cities of the Union of Soviet Socialist Republics.

Kharkov is important because of its central position in the upper Donets basin, one of Russia's richest districts (*see* Ukraine). The city stands midway between the mighty Dnieper and Don rivers, each about 125 miles distant. Moscow lies about 400 miles to the north. Here is the collecting point of grain from the Ukraine fields, fruit from the Crimea, and oil from the Caucasus. Late in the 19th century the great Donets coal fields and the iron deposits of Krivoi Rog, to the southwest, were developed. Thus supplied, Kharkov developed steel industries and manufacturing. Six railroads and, later, several air lines were established to serve Kharkov's ever-expanding industries. The Dnieper Dam, built in 1932 at Zaporozhe, about 150 miles southwest, to produce electric power, created another large industry—the manufacture of electrical equipment.

Ambitious and hard-working Kharkov grew from a sprawling provincial town into the "Pittsburgh of Russia." It rebuilt its cobblestone streets into smooth avenues, beautified them with parks, and lined them

with modernistic buildings. Scientific laboratories, technical schools, and more than 50 libraries were built. The University of Kharkov (founded 1805) was enlarged. These and a superb collection of Ukrainian art made Kharkov a distinctive cultural center.

Kharkov began in 1654 as a Cossack outpost to defend Moscow in its wars against the Poles and Tatars. At times it replaced Kiev as capital of the Ukraine. The Russian civil wars of 1917–20 overran Kharkov. In the second World War it was seized by the Germans, and some 100,000 citizens died during the occu-

pation. The battle to free it in 1943 destroyed half its buildings, but those inhabitants who had fled soon returned, and the Soviet government rebuilt the city and factories. Population (1947 est.), 900,000.

KIDD, CAPTAIN WILLIAM (1650?–1701). Numberless legends attached to the name of Captain Kidd have made him the most famous of pirates. Oddly enough, the charge of piracy was never definitely proved against him, and authorities now seriously doubt whether he was ever a pirate at all.

William Kidd was a Scottish minister's son, and followed the sea from his youth. In King William's War between the English and the French, he became known as the bold captain of a privateer in the West Indies. By the end of the 17th century he had become a successful shipmaster sailing from New York. British commerce then suffered greatly from

marauding pirates, so, at the request of the governor of New York, Kidd received two commissions from the king addressed to "our trusty and well-beloved Captain Kidd"—one for suppressing piracy and the other as a privateer against the French. With his 30 guns and his crew of 155 men, the captain jauntily set sail in his ship *Adventure* for Madagascar, Malabar, and the Red Sea region, the chief haunts of the pirates.

Then his troubles began. No pirates were found, a cholera plague destroyed some of the crew, the ship grew leaky, and supplies began to give out. Then, apparently, Captain Kidd was overruled by his mutinous crew, which seized his vessel and turned to

MUTINY ON THE 'ADVENTURE'



This is the incident off the African coast that brought Captain Kidd to the gallows. It was the crew, he said, that forced him to piracy.

piracy. They captured several small Moorish vessels, fought with a Portuguese man-of-war, and finally took the *Quedagh Merchant*, a rich Armenian prize.

Kidd's Arrest and Conviction

At this point, according to Kidd's later testimony, he regained his command, abandoned the old *Adventure*, transferred the captured booty to a sloop, and set sail for America, intending to turn over the loot to the colonial authorities. But he was arrested in Boston, where he landed, and sent to London for trial. There he was convicted of murder for killing a mutinous sailor. After a trial in which the evidence was inconclusive and he kept protesting that he was "the innocentest person of them all," he was pronounced guilty also of piracy. He was hanged at Execution Dock with several of his companions, and his body long hung in chains, a warning to all would-be robbers of the sea.

His fame was spread abroad by the popular ballad "My name is Captain Kidd, as I sailed, as I sailed," and many a romance, such as Stevenson's 'Treasure Island' has been inspired by stories of his adventures. From time to time people still search fruitlessly under the banks of the Hudson or on the shores of Long Island Sound for the hoard of gold and silver and precious stones said to have been buried by him.

KIDNEYS. Did you ever go through the filtration plant of a large city waterworks, where the supply comes from an impure source such as a river? There you see streams of impure water pumped in, mixed with chemicals, and finally passed through great beds of sand that stop the impurities but let the good clear water pass through to the pipes of the city.

The kidneys of the human body are the purifying and filtering plant for the blood. They gather up the wastes from the blood and throw them off through the bladder in the form of urine. They serve also to maintain the proper composition of the blood by eliminating not only waste products but also normal constituents, such as sugar, when these happen to be present in excess.

The kidneys are a pair of bean-shaped glands about $4\frac{1}{2}$ inches long, $2\frac{1}{2}$ inches wide, and $1\frac{1}{2}$ inches thick. One is situated on each side of the spinal column, directly under what is called the "small of the back." The right one is placed slightly lower than the left, to make room for the liver. They are protected by a mass of fat. Each kidney is made up of a million or more tiny tubes. The cells which line these tubes do the work of collecting waste from the blood as it passes over them.

Ordinarily the kidneys throw off three to four pints of urine every day. Anything which interferes with the activity of these organs means the accumulation of poisonous waste matter in the body and immediately brings on serious sickness or even rapid death. It is this that makes diseases of the kidneys so serious. "Bright's Disease," for instance, is an inflammation of the kidneys which interferes with their normal activity and causes them to throw off albumin. Unless this condition is cured, the waste poison called *urea*

accumulates in the blood with fatal results. Sometimes chalklike stones are formed in the kidneys and stop up the passages.

Almost all diseases have some effect on the kidneys. Hence one of the methods most relied upon by the physician in determining the general health of a patient and detecting unsuspected trouble is to make a chemical analysis of the urine.

KIEV (*kē'yēf*). One of the most brilliant victories of the second World War took place in November of 1943, when Russian forces stormed across the Dnieper River and drove the German invaders from Kiev, where they had been since 1941. For Kiev, however, this was an old story. During the 11 centuries of its history it had come to know too well the clash of armies and the fires of destruction (*see* Russia).

Ancient Kiev remains one of the most important cities in new Russia. It is the capital of the Ukrainian Soviet Socialist Republic. It lies on the Dnieper River in the heart of the Ukraine, the greatest wheat-growing area of Europe. There are busy wharves along the river, smelting works, flour mills, sugar refineries, distilleries, and tobacco, leather, glass, nail, and other factories. From a military standpoint, it controls the huge U-shaped territory embraced by a great looping stretch of the Dnieper. But perhaps more important than all else is the love which this "Mother of Cities" inspires in the Russian people.

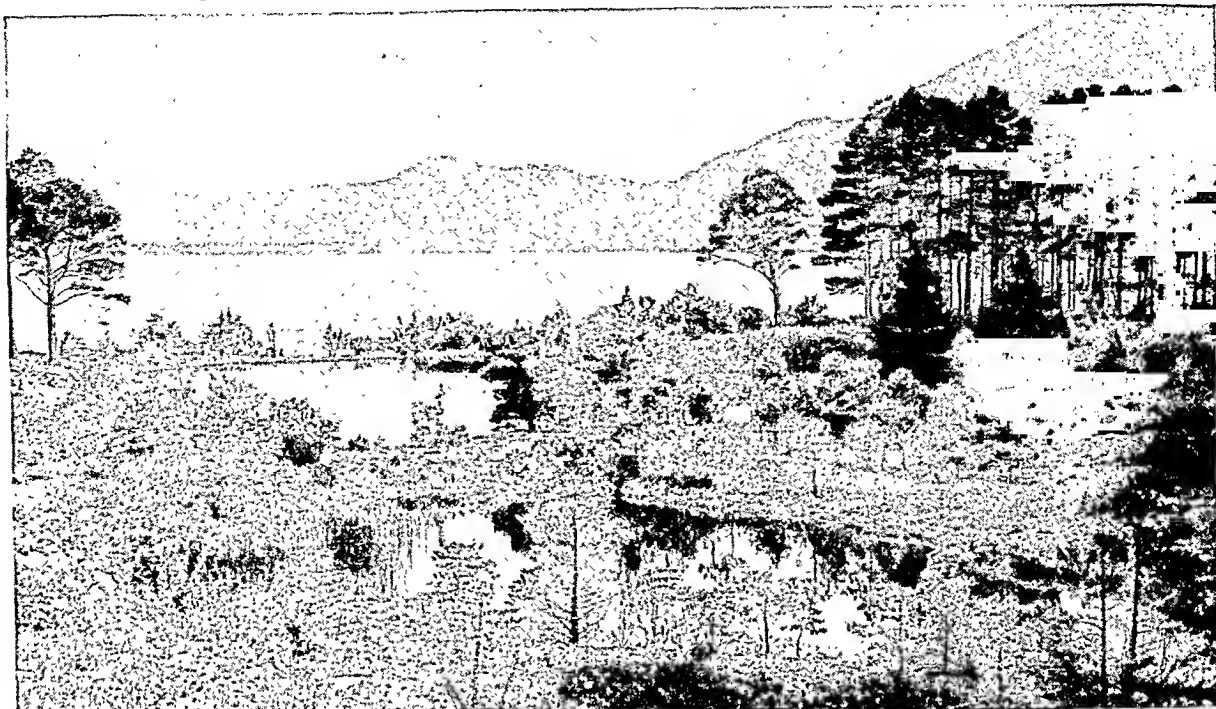
Kiev was founded before the 5th century, and in the Middle Ages it was already rich and famous. In the course of its development, it grew into two distinct parts—the old city crowning the heights of the many hills; the low-lying business section, called the Podol, which came to include the Jewish quarter.

The city became the home of the Russian Orthodox faith when, a thousand years ago, Grand Duke Vladimir, ruler of Kiev, was baptized in the waters of the lazy Dnieper. The lovely St. Sophia Cathedral was built and became famous for its golden-topped bell tower and its 11th-century frescoes and mosaics.

The 11th century also saw the rise of the famous old monastery called the Petcherskaya Lavra, the "city of caves." This became a great community in itself, with walls and towers, inns, churches, schools, and print shops. The Mongols destroyed the Lavra buildings when they sacked Kiev in 1240. Rebuilt by Peter the Great, the monastery was turned into a museum and art school by the Soviet government. Until the Russian Revolution of 1917 the catacombs, where saints lie buried, were a mecca for pilgrims.

When the Russians re-entered Kiev in 1943, its population had dwindled to an estimated 75,000. The rescuing army found the monastery wrecked, blocks of houses gutted, and bridges, factories, and Kiev University destroyed. But the Cathedral of St. Sophia still raised its graceful cupolas to the sky, and other old buildings that made Kiev one of Russia's beautiful cities stood intact. Soon the rebuilding of Kiev was under way. Population (1947 est.), 900,000.

ONE OF THE BEAUTIFUL LAKES OF KILLARNEY



This is Lough Leane, the Lower Lake. In the foreground is a peninsula called Ross Island. It cuts the lake nearly in half. Part of the beauty of the lakes of Killarney is in the deep, rich greenness of surrounding grass and trees.

KILLARNEY, IRELAND. One of the most beautiful spots in the British Isles—in all the world, the Irish say—is the region around the little town of Killarney in the County Kerry. Three lakes lie one below the other in a green valley enircled by low-lying mountains.

Lough Leane, the Lower Lake at the north, is the largest, about five miles long by two miles wide. On its northeast side stands the little town of Killarney. Many small islands break the blue surface of Lough Leane. Most beautiful is Innisfallen, with its groves of holly and the ruin of St. Finian's Abbey, built in the 6th century. On the east shore of Lough Leane stand the ivy-covered ruins of Ross Castle and of Muckcross Abbey, built in the 15th century.

From the southern end of Muckcross, or Middle, Lake rises Torc Mountain. A winding stream called the Long Range links the Middle Lake with the small Upper Lake, where trees of Kerry arbutus (*Arbutus unedo*) blossom. To the west lie the highest mountains in Ireland, Macgilllicuddy's Reeks. Not far from the lakes, between Purple Mountains and the Reeks, is the Gap of Dunloe. This is a wild, narrow, boulder-strewn gorge. Legends say that the great hero Finn MacCool slashed it into the mountains with one blow of his sword.

Most of the area around the lakes is a national park. There are many hotels. Fishing for both trout and salmon is good. Killarney is 186 miles southwest of Dublin. Population (1946 census), 5,947.

KILMER, ALFRED JOYCE (1886-1918). American school children know the poem 'Trees'. It first appeared in *Poetry: A Magazine of Verse* in 1913. Like so much of Kilmer's poetry, 'Trees' celebrated an ordinary thing with lyric simplicity.

Kilmer was born in New Brunswick, N. J. When he was eight years old he entered Rutgers Preparatory School. His interest turned to writing and he became editor of the school paper. He also won prizes in public speaking. At 18 he entered Rutgers College. Two years later he transferred to Columbia University. After graduation in 1908, he married Aline Murray.

After a year of teaching Latin, Kilmer joined the staff of a dictionary publisher in New York. He also served as literary editor of the *Churchman*, a publication of the Episcopal church, to which he belonged. In 1913 he began to write newspaper articles and book reviews. He was converted to Roman Catholicism, which influenced his later writing.

When the United States entered the first World War Kilmer enlisted as a private. In France he became a sergeant. On July 30, 1918, during the second battle of the Marne, he was killed while scouting German machine gunners. He

was buried near the village of Seringes, but was later moved to the American cemetery at Fère-en-Tardenois. He was awarded a posthumous Croix de Guerre. Joyce Kilmer's best-known books are 'Trees and Other Poems' (1914), 'Main Street and Other Poems' (1917), and the war poem 'Rouge Bouquet'.

JOYCE KILMER



This is the young soldier-poet who wrote 'Trees'.

The KINDERGARTEN, Step Between HOME and FIRST Grade

KINDERGARTENS AND NURSERY SCHOOLS. In the years before children reach school age, it becomes more and more difficult to confine them at home and keep them happily occupied. They are able to run, to climb well out of reach to pedal a tricycle a considerable distance. They are tremendously curious not only about electrical and mechanical appliances in the home, but the steam shovel three blocks down the street. They want to know about the man who brings the mail, the bus driver, the old lady who walks with a cane, and about other children—the little girl with the doll carriage and the twins next door.

They begin to ask questions which are enough to “stump the experts.” But they are satisfied with simple answers. When they ask what a book says and begin to notice words and letters, they are not demanding to be taught the alphabet. They often attempt more than they can finish. They lay out an airplane hangar on the living-room floor, but fatigue overtakes them and they leave it for grownups to trip over. Sometimes they surprise themselves and their parents. They may carry a list to the grocery store and bring home every item. They may dry the dishes and pick up their toys. But these efforts are spurts. Parents cannot expect such mature behavior consistently.

In many homes today, parents do not have the time to supervise the full day of play the child's nature demands. Wise mothers and fathers recognize that trained teachers are better qualified than parents to develop a child's abilities to the utmost. Finally, young children need the experience of playing with other children as training for social life in later years. All these needs can be met by the kindergarten. (The



This big room has plenty of space for big ideas. The boys in the background are experimenting with different kinds of ramps. Girls build just as eagerly as boys. Notice in the upper right corner that the coat hooks are at an easy height for four-year-olds.

word “kindergarten” is German for “child garden” and well expresses the opportunity given the child to grow in mind and body as well as socially.)

How Kindergartens Work with Children

What kind of living goes on in a good kindergarten? First of all, a child can be himself. His ideas are respected, while he learns gradually to respect the

YOUNG EXPLORERS VISIT THE RIVER



These children have walked from their near-by school to a hill overlooking the river. Most of them have picked up treasures along the way. Some are most interested in the feel of the earth and green grass; others delight in the river traffic.

ideas of others. His teacher knows that no two children start with the same abilities, or grow in quite the same way. Six youngsters who have lived near each other and played together a good deal will carry on with some of the play ideas they have been using in their own backyards. Other children have had an older brother or sister who has fought at least some of their battles for them. Now they need some protection from children their own age. Some children will seize new experiences. They can be expected to try everything in the room and will chatter about it all when they get home. Other quiet ones will look, listen, and really enjoy themselves, but say very little. Knowing all this, the teacher plans at the start for small groups, which let the children become acquainted with one another.

What kind of learning takes place in kindergarten? Social learning, getting along with other people, is most important. But the setting must provide for many other kinds of learning as well. The paint, clay, building blocks, housekeeping toys, which one finds in every good kindergarten, are not provided solely because children of this age enjoy using them.

Learning by Doing

A child stands with brush in hand, chooses his favorite color and sweeps it over a big piece of white paper. Then he dots it with blobs of black. He may comment to his teacher, "That's the way the sun is. All red. And the buildings black." She does not check his accuracy. She knows that as he paints what he sees and feels, he develops his ability to observe. As he grows older he will become more self critical and will want to make the sun and buildings look right; but this does not often interest him at five.

Three boys are working on a large block of construction. One says, "It does so have a second story. And there is an elevator." The teacher asks a question, finds they have enough blocks to make a second story, discusses with them how they could raise things from the first to second floor, sends one child for the suggested pulleys, helps the others select wood for the elevator. She does not discuss with the children the physical forces of gravity and friction but obviously the children are learning to deal with them.

There are no arithmetic lessons, but the children learn a great deal about numbers. Sally collects a pile of pie plates in the sandbox. Jane protests, "She has them all. A whole bunch." The teacher helps them

to count how many there are and plan how they can be shared. "There are six, two for Sally, two for Jane, and two for Rita." Arnold tells his willing helper that four more blocks will be needed to complete their building. When cookies are baked, halves and quarters are carefully measured.

Over in one corner, Mary and Susan are washing doll clothes. "I like to do this," says Mary, "but my

mother doesn't. The laundryman takes our clothes every Tuesday and brings them back on Friday." Susan considers this as she carefully dumps her pile of washed and rewashed clothes back into the soapy water for another rub. "We have a washing machine," she murmurs. How people live, different ways of doing things—these are part of important learning in kindergarten.

Sometimes the kindergartners go visiting in the neighborhood. It may be to the grocery store to buy ingredients for cookies. Perhaps it is



These boys are studying a pair of rats. Their eager interest is typical of kindergarten children. Living things excite their curiosity, and they learn many facts of nature from watching animals and insects.

to see some kittens, or to watch the men who are putting in a new sewer. Sometimes they are just exploring. "Let's see how many interesting things we can find today." At other times they have a more definite goal, "Let's see what goes on at the automobile repair shop."

Frequently people come to visit the kindergarten. A mother who plays a violin gives a short concert. A father who drives a transcontinental truck stops by to leave his son's rubbers and stays to tell how he and his co-driver take turns driving and sleeping.

In dramatic play the child lives over many of the things that have happened to him and acts out events as he sees them. A girl scolds her dolls, a boy drives a big truck. Each one telephones the neighbors. These dramatic creations usually spring from the child's own life experiences. They mean more than the stories and poems that are read to him. Fairies, elves, and dragons may enter into dramatic play, depending somewhat on the background of the children. Most five-year-olds, however, are absorbed with the problems of understanding what goes on immediately around them. Too fanciful material confuses them. Teachers accept whatever fantasy the children introduce, but they do not offer it unless the children are clearly ready for it.

Music Plays Important Rôle

Music is always associated with the kindergarten and seems to permeate the program. Children have both listening and creating experiences. An alert teacher picks up the music the children make as they play. She notes the rat-tat-tat of Jerry's hammer as

he fastens a railing of nails to his boat, and the chant which Mary sings as she sets the table for lunch. Sometimes the whole group joins in making up a song. This is in addition to all the favorites they have learned together.

Music is not just to be sung. It is something they have in their muscles too. They love to run, to skip, to roll, to do cart wheels and somersaults. The teacher's drum is accompaniment enough but it is fun to have a piano sometimes. Recorded music brings added richness. Occasionally guest performers come to the kindergarten. The children especially enjoy an opportunity to examine the instruments and to ask questions about them.

Books Prepare for Reading

The kindergarten has a wealth of books. Some of these have pictures which in themselves tell a story. Others are designed to be read to the children. Some get to be such favorites that the children memorize them and will pretend to read them from cover to cover.

In many ways children in kindergarten learn to appreciate what it means to be able to read. They learn to identify their own names and sometimes those of their friends on their various belongings. They know that a sign saying "Do not disturb" left on a half-finished block building is something to be respected. Sometimes they ask questions which can only be answered by consulting books. They watch their teacher and listen carefully to what she reads. They observe that she frequently writes notes so that important items will not be forgotten. When they cook they have a recipe which must be carefully followed. Sometimes they dictate letters to children who are absent. Some children like to make up stories and poems. The teacher writes these down and reads them back.

Conversation Builds Vocabulary

A lot of talking goes on in kindergarten. Children talk to each other, to the teacher, to the visitors. They know a great many words and are eager to demonstrate their power. They delight in knowing the correct terms for everything they see, and in a rich environment in which they can question freely their vocabulary increases rapidly.

While they are having all these experiences some children become quite interested in reading. They ask questions about words they see in books or magazines, or signs, and packages. They may indicate that they know some of the letters. Their teacher recognizes these as signals of developing reading ability, but she does not sit them down with a primer. Nor is she concerned about children who show less interest. Those black symbols on the white page are extremely complicated for the young child. It takes a long, long period of seeing other people read and write, of noting

PLAYMATES TEACH CHILDREN TO SHARE



Learning to share isn't easy. The expression of the child in the top picture indicates how much she would like to keep all the blocks for herself. The children in the center picture are enjoying the colorful illustrations in their book. The group at the bottom is working with clay.

how those strange black figures stand for things one knows, before any child is ready to spend concentrated time on learning to read.

A good kindergarten program helps to build up the kind of background which should help a child in learning to read. But the child's eventual reading is not

allowed to interfere with what goes on in the kindergarten. Precious time for investigation and exploration are not cut short by needless exercises hopefully designed to further "reading readiness."

Measures to Promote Health

Kindergartens emphasize the health of children. Good programs provide for thorough physical examinations and continuous health supervision. An effort is made to balance vigorous physical activity, quiet activity, and rest, according to the needs of each child. The hot noon lunch and the afternoon nap which are characteristic of many nursery schools have contributed considerably to improved nutrition. In the shorter day of most kindergartens only a "snack" of fruit juice or milk is served. Some schools have an "all-day" kindergarten program which includes a hot lunch and an afternoon rest and ends at half-past two or three.

Outdoor exercise is a vital part of a good health program for young children. Boards to balance on, bars to swing from, places to climb, heavy things to push and pull—all help to strengthen their growing muscles. Well protected by snow suits and boots, children play outdoors even in cold weather. In mild climates kindergartens move housekeeping play, painting, music, even lunch and the rest period out to a pleasant yard. Buildings now being constructed especially for nursery schools and kindergartens arrange to have the outdoor and indoor play space adjacent to each other.

The First Kindergartens

Friedrich Froebel founded the first kindergarten in Germany in 1835 (*see* Froebel). The movement was introduced into the United States between 1850 and 1860 by educated German immigrants. The first distinctly American kindergarten was opened in Boston in 1860 by Miss Elizabeth Peabody. St. Louis is usually credited with being the first city to have a kindergarten in a public school system (1873).

In 1913, California enacted a law, later copied by other states. It provided that boards of education of every city, town, county, or district, upon receiving the petition of parents or guardians of 25 or more children of kindergarten age, must establish a kindergarten. To support it a tax must be levied.

Rise of Nursery Schools

Not all kindergartens are limited to the five-year-old child. Some school systems have kindergartens which enroll children at the age of three or four. Group training of children below kindergarten age began in England shortly before the first World War. Under the guidance of Margaret and Rachel McMillan, nursery schools were established in the slum districts of London to help improve the physical condition of children.

In the United States, the nursery school began in research centers established at various universities

and colleges in the early 1920's. An increasing awareness of the needs of young children spread from these centers to professional workers and parents. Nursery school programs were subsidized by the Federal government during the depression years in the 1930's, to provide employment for teachers and other workers; and during the second World War, to free mothers for work in industry.

The Association for Childhood Education, an outgrowth of the International Kindergarten Union established in 1892, has been especially active in research to reveal the needs of young children. At its headquarters, 1201 Sixteenth Street, N. W., Washington, D. C., current materials relating to kindergarten education are always available. The National Association for Nursery Education, with publication headquarters at W 514 East Hall, University of Iowa, Iowa City, Iowa, has concentrated on the younger children. Helpful information can also be found in the pamphlets published by the United States Children's Bureau.

KING, WILLIAM LYON MACKENZIE (1874-1950). From 1921 until his retirement in 1948, Mackenzie King was five times prime minister of Canada. No other statesman had served so many years as the head of a democratic government.

Under Mackenzie King's guidance, Canada achieved final independence as written into law by the Statute of

Westminster (*see* Canadian History). As his own foreign minister from 1935 to 1946, he maintained friendly relations with the United States, which he understood better than any other Canadian statesman. His great ability as a conciliator helped to promote national unity between the diverse French and English-speaking elements of Canada. In 1921 Canada was a young country suffering from the depression following the first World War. Under Mackenzie King's leadership it emerged from the second World War as one of the world's strong nations.

He was born Dec. 17, 1874, in Kitchener (then Berlin), Ontario. His

mother was the daughter of William Lyon Mackenzie, leader of the Rebellion of 1837 (*see* Mackenzie). Mackenzie King was educated at the Universities of Toronto and Chicago, and at Harvard. In Chicago he lived at Hull House, where he first studied the social and labor problems which were his greatest interest for many years. As a traveling Fellow at Harvard, he studied labor conditions in Europe, and lived for a time at a settlement house in London's East End. On his return to Canada, his investigation of sweat shops in Toronto brought him to the attention of the dominion government. He was asked to organize a new bureau of labor in 1900 and to become its deputy minister. In 1908 he was elected to the House of Commons. The next year he was made Minister of the Department of Labor, with a seat in Sir Wilfred Laurier's Cabinet.



MACKENZIE KING

The aging Laurier saw great promise in the younger man, and became Mackenzie King's political adviser and close friend. From 1914 to 1917, while Laurier's party was out of office, Mackenzie King investigated industrial relations in the United States under the auspices of the Rockefeller Foundation. In August 1919, he became leader of the Liberal party. He started his long service as prime minister on Dec. 29, 1921. It was broken for only three months in 1926, and from 1930 to 1935. He resigned as prime minister in November 1948 but retained his seat in parliament. He died on July 22, 1950.

KINGBIRD. This is one of the most familiar representatives of the American flycatcher family. It is about eight inches long, nearly black above and white underneath. The head is quite black, with a flame-colored crest surrounded by white and orange which can be erected at will. The kingbird catches insects on the wing, and is often called the bee martin from the number of honeybees it eats. It is found throughout North America in the summer, but is rare west of the Rocky Mountains. Several related species in the western part of the United States are often called kingbirds (see Flycatchers.)

KINGFISHER. The common belted kingfisher makes his living by acrobatic tricks. From a perch sometimes as high as 50 feet above the water he does a sudden dive, seizes some luckless little fish in his long beak, flies back to his perch, tosses the fish into the air, and swallows it head first. At times he beats the fish against the perch before swallowing it, or he may carry the fish away to his young family. But one part of the performance is always the same—the meteor-like swiftness of the bird's plunge.

The kingfisher family is a large one, with about 200 species, distributed over the greater part of the globe, eleven of them in America. All are remarkable for the beauty of their plumage and their interesting habits (for illustration in color see Birds). They are unsociable birds, and when a pair has taken out "fishing rights" in a particular neighborhood, it allows no trespassing there by others.

The kingfishers nest in holes which they dig in banks, from 4 to 15 feet deep. The five to eight eggs are laid on a heap of fish bones, and the young grow up in quite a fishy atmosphere.

The belted kingfisher is the commonest American species. It is about 12 inches long, with a bristling black crest which gives it a savage look; its upper feathers and belt are bluish gray, and under parts white. The females have a reddish band across the abdomen. The large bill is a powerful sharp-edged implement that is capable of catching an insect on land, or a slippery fish under water. The belted kingfisher's call is a loud rattling cry unlike the call of any other bird. This species winters in most of the central and southern parts of the United States. The Texas kingfisher is a smaller bird, green above and white below. He resembles the belted kingfisher in habits.

The kingfisher family is most numerous in the Malay Archipelago and New Guinea, where there are many vividly colored species. The common kingfisher of Europe, with its blue-green upper parts and rich

chestnut breast, is an example of the striking plumage some members of this family wear.

Many beautiful legends are connected with the European kingfisher, or *halcyon*, as it was anciently called. An old belief was that the seven days preceding the shortest day of the year were used by these birds to build their nests, which, it was thought, were made of fish bones, and floated on the water. The seven days following were devoted to hatching the eggs. The whole two-week period was called "the halcyon days," during which, the ancients believed, the sea was always calm and the weather bright. That is why we use the word "halcyon" to describe calm, peaceful, and happy days. The power of quelling storms was believed to have

been conferred upon the kingfisher by Aeolus, the wind-god, who made this dispensation when his daughter, Alcyone, and her husband, Ceyx, were changed into kingfishers by Zeus. This myth accounts for the ancient and poetical name of *halcyon*.

The scientific name of the kingfisher family is *Alcedinidae* and they belong to the order *Coraciiformes*. Scientific name of belted kingfisher, *Megasceryle alcyon*.

THE FISHERMAN WITH THE HIGH COLLAR



Besides his white collar, this kingfisher has a band across his breast which has given him the name "belted kingfisher." Notice his alert eye, his bristling crest, and his strong straight bill.

KING GEORGE'S WAR. The third of the series of wars fought in the American colonies as part of the conflicts which shook Europe in the 18th century took place during the reign of King George II of England. In the European war Prussia, France, and Spain were lined up against Austria and England in the War of the Austrian Succession (1740-48), a struggle for balance of power, commerce, and colonial possessions (see Maria Theresa).

In the colonial war, which was fought from Canada to the Caribbean, the English had to fight both the French and the Spanish. English expeditions against Cartagena, great Spanish stronghold on the South American coast, and St. Augustine, Fla., came to nothing, as did a retaliatory Spanish expedition against Georgia.

The principal event of the war was the capture in 1745 of the French fortress of Louisbourg on Cape Breton Island by an English fleet and an army of New England colonials led by William Pepperell. From this stronghold, built to protect the southern entrance to the Gulf of St. Lawrence, the French had hoped to recapture Acadia to the south, which they had lost in Queen Anne's War. In the Peace of Aix-la-Chapelle (1748), Louisbourg was restored to the French, and the war ended indecisively. But the so-called peace was a mere truce before the final struggle in which the French lost New France to their English foes (see French and Indian War).

'KING LEAR'. By many judges this master tragedy of Shakespeare is ranked as the finest piece of dramatic literature in the world. Lear, a headstrong old sovereign of ancient Britain, divides his realm into three parts, and then calls on his three daughters each to receive her share according to the love she professes for him. Goneril and Regan, ill-reared and deceitful women that they are, so insult reason with their extravagant avowals that the youngest daughter, simple honest Cordelia, becomes disgusted with them and states her own dutiful love too modestly to please the proud old king. He casts her off penniless, so that she would have been poor indeed had not the pitying King of France straightway claimed her as his bride and queen. Having thus foolishly bestowed his kingdom, Lear learns—

How sharper than a serpent's tooth it is
To have a thankless child!

Shorn of every kingly dignity, denied by his elder daughters even the respect due to a father, the old man rushes out into the tempestuous night, lest his brain burst with its insupportable storm of rage and grief. In the pauses of the tempest, we hear his terrible curses, his piteous prayers, his mad mutterings, and the bitter pointed chatter of his faithful fool.

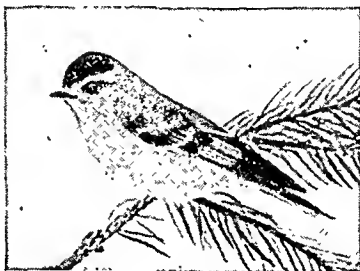
One gleam of peace breaks upon his sin and suffering. This is when Cordelia and poor sick Lear are

reunited, with the avenging armies of France about them. But their armies are defeated and Lear is next seen bearing the dead body of Cordelia from prison, where her cruel sister has caused her to be hanged. The guilty daughters perish and their party is overthrown, but Lear dies of a broken heart. Describing Cordelia, Lear says:

Her voice was ever soft,
Gentle, and low,—an excellent thing in woman.
And it is Lear again, weighing his deserts in the storm, who says:

I am a man
More sinned against than sinning.
Gone quite insane with suffering, he replies to the question "Is it not the King?" with the proud remark:
Ay, every inch a King!

KINGLETS. With the humming-birds, kinglets are the midgets of the bird world. Though they are not shy, it is difficult to observe these tiny birds, for they are always on the move, and their plumage—olive-green above and yellowish-gray beneath—makes them inconspicuous among the leaves of the trees. The male birds have a distinguishing bright spot of orange or vermillion on the top of the head. In the ruby-crowned kinglet this spot is concealed or displayed at will (for illustration in color, see Birds). In the golden-crowned it is always visible.



The ruby-crowned kinglet is one of the tiniest of birds.

The kinglet's lovely song is all out of proportion to the size of the bird, but its call-note is thin. Kinglets nest in evergreen forests of the far north and are seen throughout the United States in the fall, winter, and early spring. Their appetite for insects makes them of great value to the farmer.

With the equally tiny gnatcatchers, kinglets form the family *Sylviidae*. The blue-gray gnatcatcher of the eastern states, and the western gnatcatcher are very similar, the upper parts bluish-gray, under parts white, forehead black, tail black with white outer feathers. Scientific name of golden-crowned kinglet, *Regulus satrapa*; of ruby-crowned, *Corthylus calendula*; of the gnatcatchers, *Poliophtila caerulea*.

KING PHILIP'S WAR. The attempt of several tribes of Algonquian Indians, led by the Wampanoags, to stand against the tide of white settlement in New England led to one of the most tragic of all wars between the colonists and the Red Men. In 1662 Metacomet, or Philip, younger son of the Pilgrims' friend Massasoit, succeeded his father as chief sachem of the Wampanoags. He tried for some years to keep peace and meet the demands of the white settlers, who were increasing in numbers and encroaching more and more on the Indians' lands. But the English suspected Philip of secretly plotting against them and forced the Wampanoags to surrender their arms (1671). Whether or not their suspicions were justified is a disputed point. At any rate, an Indian who was acting as informer to the colonists was murdered in 1675 and three Wampanoags were executed for the crime.

This act precipitated a bloody war which involved

the Nipmucs and Narragansetts, as well as the Wampanoags. Up and down the Connecticut valley in Massachusetts and in the colonies of Plymouth and Rhode Island the war raged. The Indians raided and burned settlements and slew men, women, and children, and the colonists resorted to like measures against their foes. Gradually the colonists cleared the country of Indians. Philip himself was hunted down in a swamp in Rhode Island and killed Aug. 12, 1676. At his death the war in southern New England was over, but in New Hampshire and Maine, Saco Indians continued to raid defenseless settlements for a year and a half longer.

KINGSLEY, CHARLES (1819–1875). Known chiefly in his own day as a radical writer and clergyman, Charles Kingsley was far more versatile than those who knew him only as a reformer would have believed. This spare, hawklike parson, was also novelist, naturalist, professor, and poet.

The son of a clergyman, Kingsley was born June 12, 1819, in Devonshire. He attended King's College in London after his father had obtained a rectory in that city. Later he entered Cambridge University, from which he was graduated with honors. In 1842 he went as curate to the parish of Eversley, in Hampshire, and soon was appointed rector, a position which he held for the rest of his life. He died Jan. 23, 1875, and was buried in his own churchyard at Eversley.

Deeply interested in social and economic problems, Kingsley risked his position in the church by his speeches and writings in behalf of the laboring classes. He associated himself with the Christian Socialists, a group which proposed radical solutions for the problems of a restless England. 'Yeast' (1849) and 'Alton Locke' (1849) are two of his novels dealing with social problems.

Though Kingsley's years (1860–69) as a professor of modern history at Cambridge were unremarkable, he wrote several novels on historical subjects for which he is chiefly remembered. 'Westward Ho!' (1855) tells the story of a famous Devonshire knight making history in the stirring days of Elizabeth. 'Hypatia' (1853) deals with the former glories of Alexandria, in Egypt. 'Hereward the Wake' (1866) is a tale of Saxon England about the time of William the Conqueror.

For his children Kingsley wrote delightful nature stories which have become the property of children everywhere. Among them are 'Madam How and Lady Why' (1869) and 'Water-Babies' (1863). The latter is a fairy story and nature story combined. Its hero, a little chimney sweep, is changed by the fairies into a water-baby, and he learns about the habits of the water creatures and birds. Among his amazing adventures is one about "the Isle of Tomtodies, all heads and no bodies"—a warning against too many lessons.

KINGSTON, ONTARIO. The city of Kingston stands near the east end of Lake Ontario, on a channel from the lake to the St. Lawrence River. Its harbor is the southern outlet of the Rideau Canal from Ottawa. Today the city is an educational and summer

resort city, although for many years it was the most important city of Upper Canada (Ontario). It still has a considerable trade, chiefly in the transshipment of grain. The harbor, sheltered by Wolfe and Simcoe islands, is one of the best on Lake Ontario.

Kingston is the seat of the Royal Military College and of Queen's University, one of Canada's foremost educational institutions. Its industries include the manufacture of locomotives, textiles, steam engines, boats, aluminum, nylon, cigars, and chemicals. Near by are large feldspar and mica mines.

Kingston got its start in 1673 when Count Louis de Frontenac, governor of New France, built a fort on the site. The fort bore his name for more than a hundred years. It was a leading French center of government and trade until it fell into the hands of the British in 1758 during the French and Indian War. United Empire Loyalists who emigrated to Fort Frontenac during the American Revolution changed the name to Kingston in honor of King George III. From 1841 to 1845, Kingston was the capital of Canada. Population (1951 census), 33,459. **KING WILLIAM'S WAR.** From 1689 until the battle of Waterloo in 1815 the French and the British with various allies fought a series of wars on land and sea in a struggle for power on the European continent. Several of these wars were fought in America as well, for there too the French and English were rivals. Each determined to expand its territories, enlarge its trading area, and claim and hold as many strategic points as possible. The American wars finally resulted in the conquest of New France by the British.

The first of these European wars began after William of Orange, already the chief enemy of Louis XIV of France, was given the English throne. It was fought chiefly to check the attempt of Louis XIV to push his boundaries east to the Rhine. In European history it is known as the War of the Grand Alliance, or the War of the League of Augsburg, because Spain and the Austrian Empire joined William in the conflict (*see* William III; James II).

The American phase of the struggle is called King William's War. Both the French and English were helped by their Indian allies. The French resorted to Indian methods of warfare, making raids along the frontiers of New York and New Hampshire and against the settlements of Maine and slaughtering the inhabitants of villages. The English planned expeditions against Montreal and Quebec. A fleet commanded by Sir William Phips captured Port Royal (now Annapolis Royal, Nova Scotia), but Phips's sea expedition against Quebec was defeated by Frontenac, the French governor (*see* Frontenac). Iberville, in command of French ships, took Newfoundland and Hudson's Bay.

The Peace of Ryswick, signed in 1697, which terminated both the American and the European struggles, restored all territorial gains in the colonies. But peace was of short duration, for five years later, Queen Anne's War (1702–13) broke out as part of the War of the Spanish Succession in Europe.

KIPLING, PRINCE of STORY-TELLERS

KIPLING, RUDYARD (1865-1936). On Dec. 30, 1865, when Victoria reigned in England and the United States had just come to the end of its Civil War, a boy was born in Bombay who was to win fame as "the spokesman for the Anglo-Saxon breed."

From both his parents Rudyard Kipling inherited the tradition and the standards that have made England great among the nations. His father, John Lockwood Kipling, was an English artist who for a time headed a school of art in Bombay and later became curator of the School of Art and Museum in Lahore. Kipling's mother, Alice Macdonald, was the daughter of a Wesleyan clergyman, one of four sisters who all married well-known men. One became the wife of Sir Edward Burne-Jones, another of Sir Edward Poynter, president of the Royal Academy, and the third sister, Louisa, married Albert Baldwin and was the mother of a prime minister of Great Britain, Stanley Baldwin.

Early Life in India and England

The first five years of Rudyard's life were spent in India. Much of the vividness, the realism of the 'Jungle Books' is probably due to the impressions that came to him, before he could talk, of the strange primitive country that lay beyond the cities and the highways of British India. He and his little sister had a native nurse, and her tales of the jungle animals lingered in his memory to crystallize later in Mowgli and Shere Khan and the gray wolves. Like most English children in foreign lands, he was sent to England at five to be educated. Too young for boarding school, he was left in the care of a woman who seems to have been the worst possible guardian for a sensitive boy accustomed to sympathy and understanding. Nearly everything that a small boy wanted to do was to her a "sin." As a punishment, even reading was forbidden, and Kipling almost ruined his eyes by devouring in secret every book he could lay his hands on. Those six years in that "House of Desolation," in which—he says rather sadly—"there was so little love and so much Bible," are described in a story called 'Baa Baa Black Sheep'.

At last his parents came home from India on leave, and they remade his world. Glasses helped his weak eyes, and he was carried off to a summer in Devonshire with his father and mother and his lively young cousins. Later in the year his father took him to the Paris Exposition—a trip that, as he says, "was an education

in itself, and set my life-long love for France." The companionship of the father whom he always adored, the endless adventure of the Paris streets, and the excitement of seeing through the artist eyes of his father the treasures of the museums and the beauty of the French countryside—these filled his mind to overflowing and brought back to him health and confidence and security.

He Goes to Boarding School

At the end of this holiday he was sent to the United Services College, a famous school for sons of English army officers at Westward Ho!, in Devonshire. His years there are recorded in 'Stalky and Co.'. Kipling himself was "Beetle." "How we, the originals of Stalky, McTurk and Beetle, came together I do not know," he says. "But our triple alliance was well established before we were thirteen." His first poems, published privately by his father, were written here.

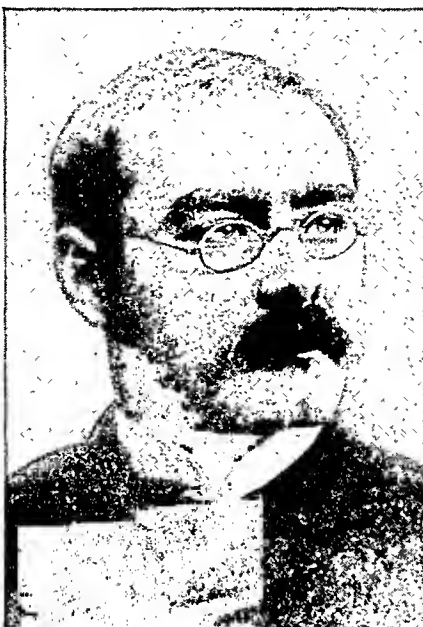
The healthy, disciplined life of the school brought him strength and fitness; the attitude of some of the teachers brought mental freedom. And in him developed that passionate faith in England and in his race that was voiced in

his writing over and over again. As the French critic André Chevrillon later said, "Kipling's patriotism was the passion that shaped his life . . . an ever-present, restless passion—an active passion which has set him apart, consecrated him and marked him with a sign."

His Return to India—Newspaper Work

When he was just short of 17, far more mature than most boys of his age, he returned to his family in Lahore, wearing proudly a small mustache which his mother promptly ordered him to remove. He became a reporter on the one daily newspaper in the Punjab, the *Civil and Military Gazette*. In his autobiography Kipling calls this interval "Seven Years' Hard." Ten hours a day, six days in the week, he worked—prowl through the streets and market places, stopping in at the Punjab Club for bits of gossip, taking adventurous trips through the native states sometimes at the risk of his life, writing at all times and in all places. To get material for his newspaper articles, he traveled around India and came to know the country as did few others. In those years, says Stephen Vincent Benét, he was "a young man, with all the arrogance, the cocksureness and the great desires of youth upon him, and before he was twenty-five he had seen an astonishing amount of naked life and death."

KIPLING AS A YOUNG MAN



This photograph shows the great story-teller and poet when he was about 30 years old, with much of his best work already done. He was "a small, spare, brown man" with shaggy eyebrows and mustache, and a humorous gleam in the weak but keen brown eyes behind the thick-lensed glasses.

It was now that Kipling began to write the poems and short stories about the British soldier in India that were to establish his reputation as a writer. 'Plain Tales from the Hills', 'Soldiers Three', and 'Barrack Room Ballads' are known now wherever English is spoken. The slim little volume called 'Departmental Ditties' he edited, printed, published, and sold himself. From these books emerged the British soldier, Tommy Atkins. Sir George Younghusband said once: "R.K. made the modern soldier. Other writers have gone on with the good work, and they have between them manufactured the cheery, devil-may-care, lovable person enshrined in our hearts as Thomas Atkins."

In 1887 Kipling was transferred to a larger and more important newspaper at Allahabad, the *Pioneer*. Here he had more time for creative writing, and he made the most of it. In 1890, eager to find a publisher for his tales and conscious that he had earned a vacation, he set sail for England, going by way of Japan, China, and North America. He stopped in New York long enough to offer his stories to a publisher; but they were rejected and he went on to England. Again he faced "hard times." His effort to make a living as a writer is reflected in 'The Light That Failed'. He did find a publisher and a certain amount of recognition; but it was several years before the man in the street discovered him. At length the vital, dramatic stories and the singing verse fired the public imagination. The books sold rapidly and his words became a part of the common speech in both England and America.

He Marries an American

Two years later, his reputation firmly established, he married an American girl, Caroline Balestier, and started off with her on a trip around the world. Her brother, Wolcott Balestier, was a writer too, and a great friend of Kipling's. Together they wrote 'The Naulahka.' Then Balestier died. Among the many elegies that English poets have written, Kipling's elegy for Wolcott Balestier stands high. Its rhythmic lines haunt the memory long after it is read:

He scarce had need to doff his pride or slough the
dross of Earth—
E'en as he trod that day to God so walked he from
his birth,
In simpleness and gentleness and honour and
clean mirth.

After their honeymoon Kipling and his wife settled down in Vermont, in a little house on the outskirts of Brattleboro. In this house their first child was born, and there Kipling wrote the tales that were to make up his 'Jungle Books.' His father visited them and made the famous drawings that were published first,

"TIGER! TIGER!"



"Once started, there was no chance of stopping." Mowgli, on the back of the great herd bull Rama, leads the buffalo charge against Shere Khan, the tiger. Illustration by Kurt Wiese from 'All the Mowgli Stories'. (Doubleday.)

with the stories, in *St. Nicholas*. Soon after the birth of their daughter, the Kiplings built a larger house not far away, which they called Naulahka. The family physician, Dr. Conland, had once served with the Gloucester fishing fleet, and he persuaded Kipling to go to Gloucester for the annual memorial service for the men who had been lost or drowned during the year. The two men listened, fascinated, to the stories of life on the Grand Banks, and Kipling went home to write 'Captains Courageous'.

After four years in America, the Kiplings decided that their real home was in England. They rented a little house in a Sussex village near his uncle, Edward Burne-Jones, and his cousin Stanley Baldwin. There in August 1897, their only son, John, was born.

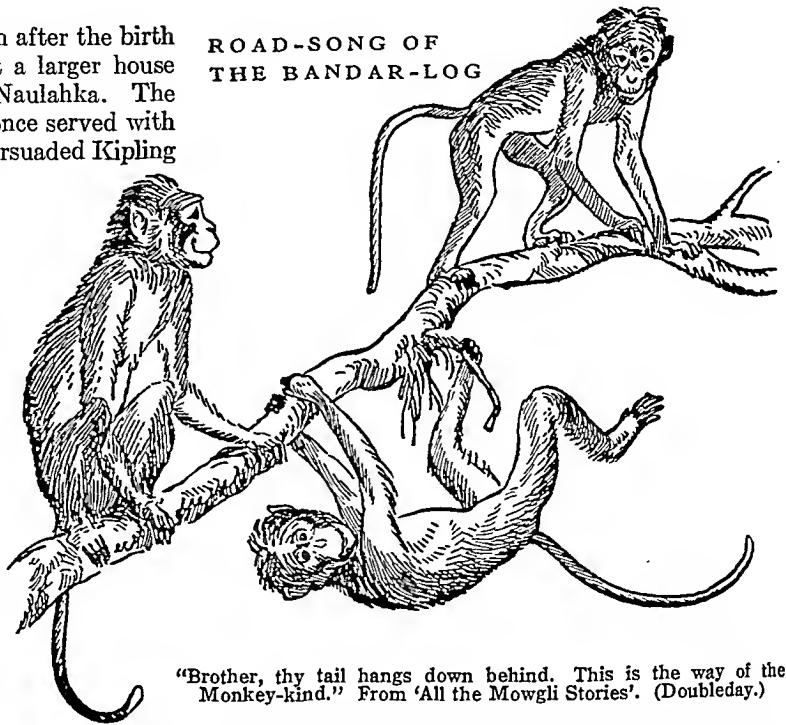
The Writing of 'Kim'

The story that we know as 'Kim' had been in Kipling's mind for years. Now, stimulated by his father's keen interest, he began to write it. He enjoyed the task and later said of it, "The only trouble was to keep Kim within bounds." The book was first published in 1901. A year later John Lockwood Kipling made low-relief plaques which were photographed for an illustrated edition.

Long visits to South Africa, where they formed a friendship with Cecil Rhodes, and another trip through North America varied the Sussex life. Early in 1902 Kipling and his wife found "the house of their dreams." It was an old house when he bought it, very old in parts. It stood on the edge of the Sussex Downs. All about it was land that had been cultivated since before the Norman Conquest, with deep meadows and splendid trees. It was called, and is called today, Bateman's. Dredging in a pond, Kipling found a Stone Age axhead and two Elizabethan "sealed quarts." "Just beyond the west fringe of our land," he wrote, "in a little valley running from Nowhere to Nothing-at-all, stood the long overgrown slag heap of a most ancient forge, supposed to have been worked by the Phoenicians and Romans."

One day his cousin, Ambrose Poynter, said to him: "Write a yarn about Roman times here." So 'Puck of Pook's Hill' and 'Rewards and Fairies' were begun. Volumes of history cannot give the vital impression that these stories give of England's past. Puck—the only fairy left in England, old and wise and kind—brings to life one by one the men and women who tell their own tales. Each story is complete in itself. Together they form a chain of "scents and sights and sounds" that reach to the very heart of England. Reading them, we see the flash of sunlight on iron as the Flint-Worker lifts his knife to defy the wolves, we hear the Roman centurions chatting in their

ROAD-SONG OF THE BANDAR-LOG



"Brother, thy tail hangs down behind. This is the way of the Monkey-kind." From 'All the Mowgli Stories'. (Doubleday.)

camp behind the Roman Wall, we smell the potatoes roasting in Old Hobden's fire, we understand why King John signed the Magna Carta, and why the Norman Conquest so affected the Anglo-Saxon race. Kipling says that his "Daemon" wrote these stories, that some power outside himself dictated them. With 'Dymchurch Flit', he says, "I was always unashamedly content."

Rewards and Sorrows

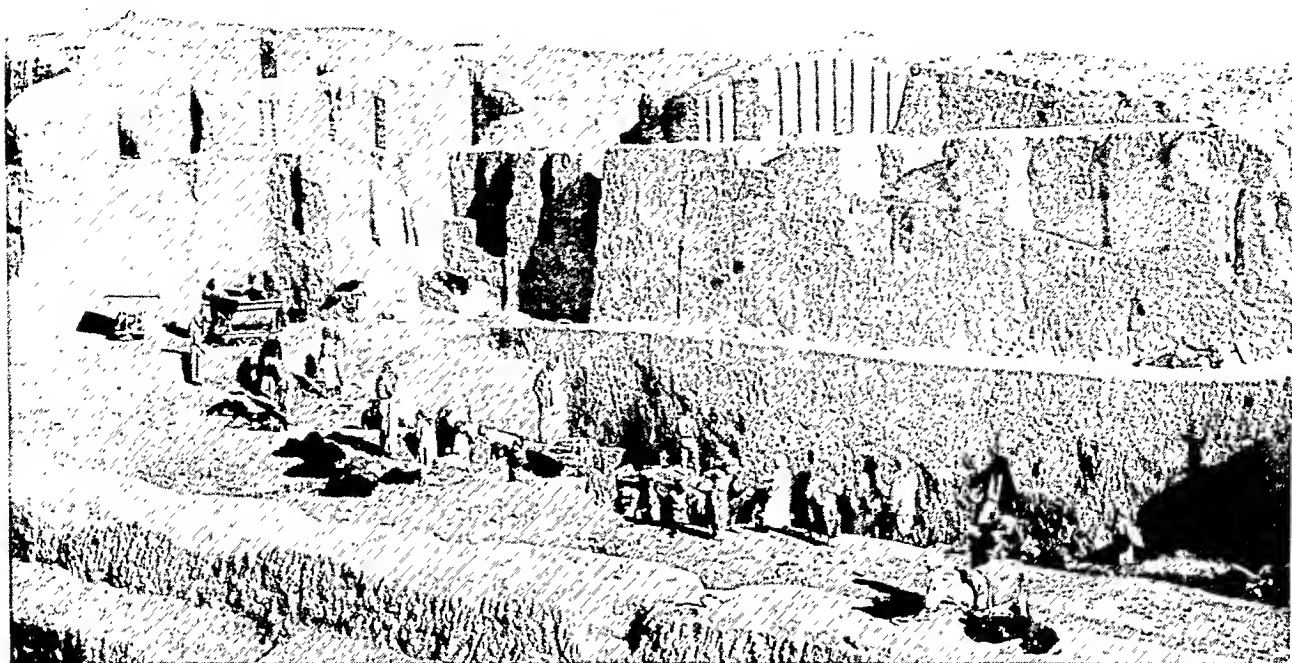
In 1907 he was awarded the Nobel prize for literature, and he and his wife went to Stockholm to receive it from Sweden's king. The first World War brought him personal tragedy. His only son was killed fighting in France with the Irish Guards. In John's memory Kipling wrote a history of this famous regiment, and the dedicatory poem has a refrain that is like a song once heard and never quite forgotten:

Old Days! The wild geese are flying!
Head to the storm as they faced it before!
For where there are Irish there's bound to be fighting,
And when there's no fighting it's Ireland no more!
Ireland no more!

With the social and political changes that followed the war Rudyard Kipling had little sympathy. More and more he withdrew from the active scene, spending the greater part of the year in his Sussex farmhouse. When he was nearly 70 years old, he sat down to write his autobiography, 'Something of Myself.' It was published after his death. This is a curiously revealing book. In it we may see the background and the events that made Rudyard Kipling, the writer. And in it we may see, perhaps more than he himself intended, the prejudices and the convictions that made Rudyard Kipling, the man.

Kipling died Jan. 18, 1936, in the same month that brought the death of England's king, George V. He

GENERAL VIEW OF THE EXCAVATIONS AT KISH



The Temple of Nabonidus may be seen at the upper right, identified by the row of dark vertical lines. It was begun by Nebuchadnezzar and continued by Nabonidus about 550 B.C. Kish was abandoned before the temple was completed. The band of dark earth beside which the laborers are excavating is the flood stratum, deposited by the Euphrates River over the entire city and destroying it about 3200 B.C. This is taken as evidence of the great flood described by the Bible. (Chicago Natural History Museum.)

was buried in Westminster Abbey with England's honored sons. Perhaps his best epitaph is expressed in the lines he wrote for Wolcott Balestier—lines that might be said of all the men who lie beside him:

They are purged of pride because they died; they know
the worth of their bays;
They sit at wine with the Maidens Nine and the Gods
of the Elder Days—
It is their will to serve or be still as fitteth Our
Father's praise.

Books By and About Kipling

Kipling's principal works are: 'Plain Tales from the Hills' (1887); 'Soldiers Three', 'Story of the Gadsbys', 'Wee Willie Winkie' (1888-89); 'The Light That Failed' (1891); 'Barrack Room Ballads' (1892); 'The Jungle Book' (1894); 'The Second Jungle Book' (1895); 'Captains Courageous' (1897); 'Stalky and Co.' (1899); 'Kim' (1901); 'Just So Stories' (1902); 'Puck of Pook's Hill' (1906); 'Rewards and Fairies' (1910); 'Songs from Books' (1913); 'The Years Between' (1918); 'Inclusive Verse' (1919); 'The Irish Guards in the Great War' (1923). The best book about Kipling is his own autobiography, 'Something of Myself' (Doubleday, 1937, o.p.). A recent study is 'Rudyard Kipling', by Hilton Brown (Harper, 1946, o.p.). For younger readers there is 'Rudyard Kipling', by Nella Braddy (Messner, 1942).

KISH. The once majestic city of Kish is today only a mound of desolate ruins, on the Mesopotamian plain it ruled some 5,000 years ago. It lies between the Tigris and Euphrates rivers, about 8 miles east of the ruins of Babylon and 100 miles south of Baghdad, capital of Iraq. Inscriptions found in the ruins state that it was "the first city founded after the Flood." As the traditional first capital of the Sumerians, Kish was one of the early great centers of civiliza-

tion (see Babylonia and Assyria). While much of the world was still in a state of barbarism, the people of Kish were building palaces and temples of sun-dried brick, transacting business by written documents, and developing arts and sciences.

In ancient times, the plain was fertile, watered by the Euphrates. The Sumerians settled along a bend of the river, and built a fortified city, more than five miles long and almost two miles wide. Until as late as the time of Sargon (about 2750 B.C.), Kish dominated the Near East. Then it declined, for the Euphrates changed its course. Kish lost its power to Babylon, built on the new course. Finally it was abandoned and drifting desert sand covered its ruins.

Archeologists from Oxford University and the Chicago Natural History Museum, in 1923-33, excavated the ruins. Digging to virgin soil, 60 feet below the top of the mound, the expedition found remains of several cultures, from Neolithic times to the Christian era. A band of alluvial soil, about 40 feet below the surface, indicated that Kish had been flooded about 3200 B.C. Many take this to be evidence of the great Biblical Flood. Equally astounding was the discovery, below the flood stratum, of a four-wheeled chariot. This is the earliest known wheeled vehicle. Other discoveries showing the highly developed civilization of the Sumerians were thick-walled ziggurats (temple towers), canals, painted pottery, and a library containing some of the earliest writing known to have existed in the world.

KITCHENER OF KHARTUM, EARL (1850-1916). One of England's military heroes was Horatio Herbert Kitchener, a builder of the British Empire, and the organizing genius of England's army at the onset of the first World War. He came of a military family, and was educated at the Royal Military Academy at Woolwich. He fought in the French army against Germany in 1871. Next, he made British army surveys in Palestine and Cyprus. In 1882 he became a cavalry officer in Egypt, and gradually rose to the command of the Anglo-Egyptian army. At the battle of Omdurman in 1898, he crushed England's rivals, the Mahdists, and then captured Khartum to avenge the death of Gordon (*see* Gordon, Gen. Charles George). This feat won Kitchener a place in the British peerage with the title Baron Kitchener of Khartum—or "K of K," as he was popularly called.

During the Boer War (1899-1902), he served in South Africa, first as chief of staff and finally as commander in chief. His system of transportation, wire barricades, and blockhouses put a swift end to the guerilla warfare of the Boers. In the next 12 years, he strengthened the empire as commander in chief in India, as inspector of the empire's forces, and as consul-general in Egypt, where his success earned him the title of earl.

At the start of the first World War, he was made England's Secretary of State for War. He soon built the British expeditionary force from 160,000 men into a mighty fighting unit of 70 divisions.

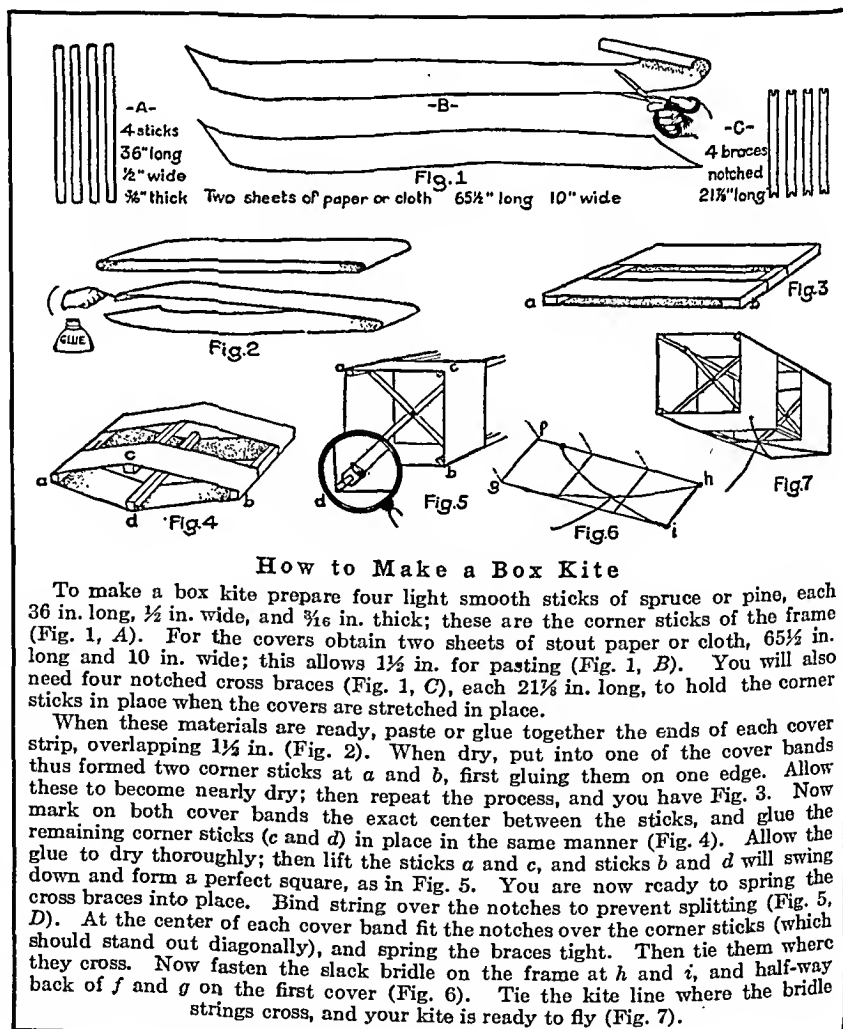
En route to Russia in 1916, he met death when his ship struck a mine near the Orkneys.

KITE. This bird of prey belongs to the same family (*Accipitridae*) as the eagles and the hawks. There are four species of kites in the United States, varying in length from 14 to 24 inches. The swallow-tailed kite, the largest of the group, has a white head and underparts, and black upper parts. The white-tailed kite, 17 inches in length, has light bluish-ash upperparts and white underparts and tail. The Everglade kite, which measures 18 inches, and the small Mississippi kite have bluish-gray plumage. They are all remarkable for their gracefulness of flight and power of gliding in the air. (*See* Hawk.)

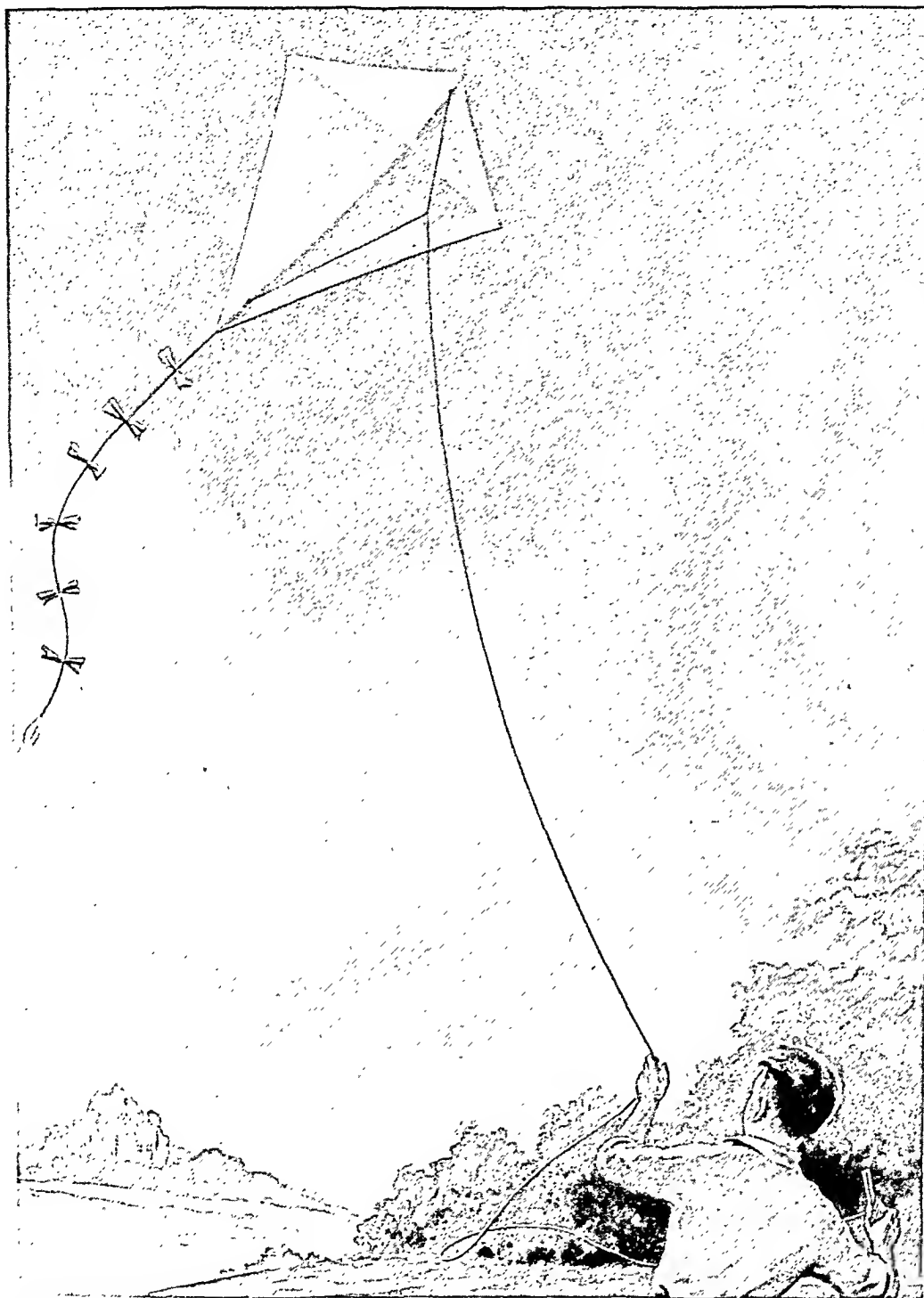
KITES. For years the daily weather forecasts were based upon reports from professional kite fliers at the government weather bureaus, but the airplane has since replaced the kite. Great box kites, carrying instruments for recording weather conditions in the upper air, were sent up from one to three miles high. To reach a height much over a mile several instrument-bearing kites were used, attached at long intervals to the same steel wire. A train of ten kites, with $8\frac{1}{2}$ miles of wire, has raised instruments to a height of more than four miles.

This was only one of many practical uses of the kite. Long before Benjamin Franklin with his famous kite and key drew electricity from a storm cloud, kites had been used for mechanical purposes. Ancient Korean and Chinese stories tell how kite strings carried cables over streams and chasms and so made passage for armies.

Even today kites are used in a similar way. Some of the greatest suspension bridges have begun from lines carried across a river by kites. Many a life, too, has been saved by kites which carried life lines



STARTING A KITE ON ITS FLIGHT



Here a kite flier has brought his kite several feet above the ground by running with it against the wind. He is now maneuvering it so that the air currents will carry it aloft. He leaves some slack in his kite string below his left hand for quick release when the kite starts to rise. Note how the tail tends to hang down and keep the kite in an upright position.

ticable nor safe, and have been superseded by the airplane and the balloon. In the second World War the Germans experimented with a man-carrying kite flown from a surfaced submarine. A helicopter propeller and tail gave the kite more lifting power.

Sport with Kites

In eastern Asia kite flying is an ancient custom and a popular pastime. It may have begun as a religious rite. Some Asiatic kites are "musical"—the wind whistling through reeds or bamboo tubes is thought to scare off evil spirits. In Korea men, women, and children fly kites during the first days of the New Year. In China "Kites' Day," the ninth day of the ninth month, is a great holiday. In China and Japan this favorite toy is made to represent gorgeously colored birds, insects, or flowers, as well as in many highly decorated geometrical forms. In some parts of the East kite-fighting is a favorite sport. The strings near the point where the kite is attached are

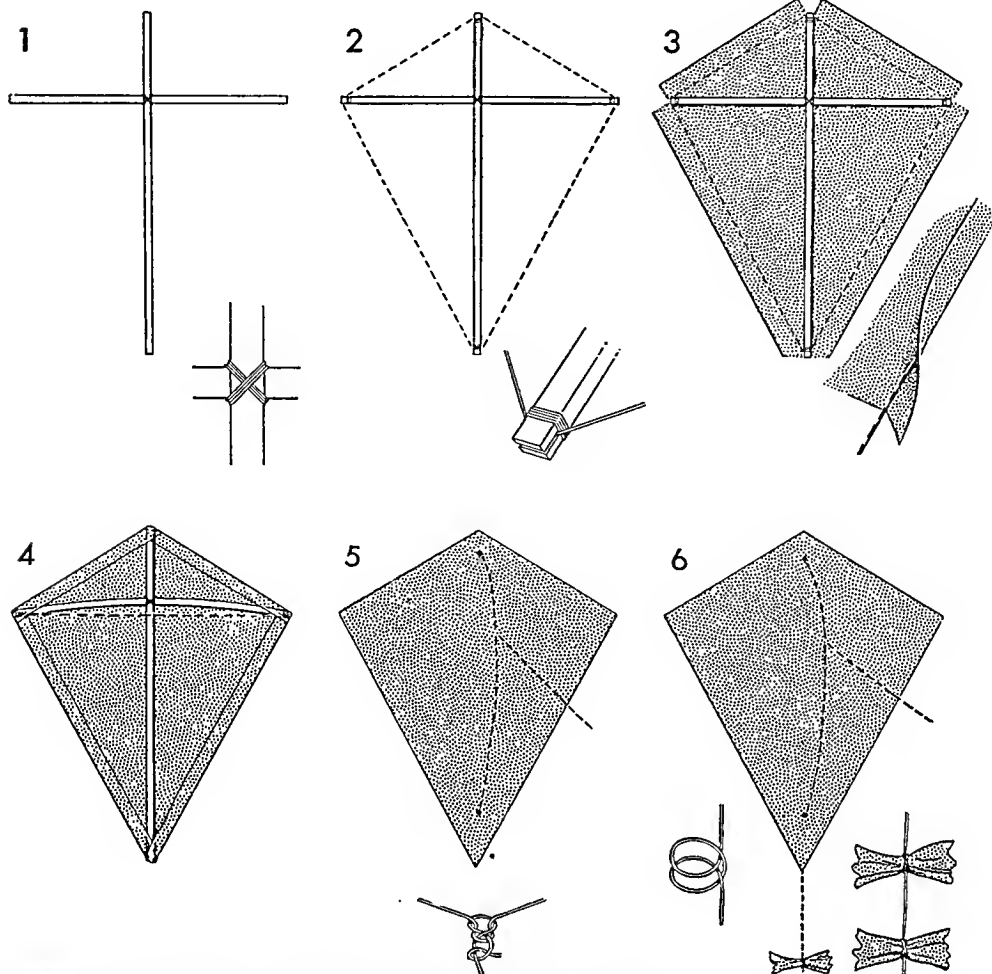
covered with glue and bits of glass, so that a player who has maneuvered his kite to windward of his opponent's can cut the cord of the other kite with a sudden jerk.

to stranded ships. Kite photography has been used for military purposes, to obtain pictures of the enemy's defenses and position. The camera was fastened to the kite frame and the shutter was operated by electric wire, clockwork, and other devices. Man-lifting military kites were once used to a limited extent for observation and signaling, but they proved neither prac-

covered with glue and bits of glass, so that a player who has maneuvered his kite to windward of his opponent's can cut the cord of the other kite with a sudden jerk.

In some cities of the United States kite tournaments are held as part of school athletic contests. Prizes are awarded for points such as strength of

HOW TO MAKE A SIMPLE KITE



These pictures show you the easy steps in making a kite of the flat or plane type. 1. Use two sticks, one about 30 inches long and the other a little shorter. Lash them together with the binding shown in the small sketch. 2. Notch the ends of the sticks and bind the sticks near the notches to prevent splitting. Stretch a string around the notches to make a frame for the "skin." 3. Cut strong tissue paper or light treated cloth to fit, leaving wide flaps. Fold the flaps over the frame, and paste or staple down. 4. With another length of string, draw the shorter stick in to form a bow. 5. Fasten a bridle to the long stick. Tie your kite string to the bridle with the knot shown in the sketch. 6. For a tail, tie strips of rags to a string, with clove hitches made as shown in the drawing.

pull, high flight, artistic effect, feature flight, and distance flash flight. In this last event, kites fastened to measured strings are flown out to the length of the strings and then are drawn back to the goal.

Types of Kites

Kites are of two general types, called "plane surface" and "box" kites. Each has several varieties, and some combination kites use both the plane and the box principles. Compound kites may have several kites on one string or on individual strings leading to a main line. The most popular plane kite is the "two-sticker" shown on this page. The two sticks may also be used to form a square frame. In another type, the "bow" kite, the cross stick is fastened to the top of the long stick and then bent down into a semicircle and held by side strings. Several other types can be made using three sticks.

Box kites are harder to make, but many boys prefer them to plane kites. You can learn how to build one

by following the diagram given on a previous page. The bridle can be fastened either to one side or to one edge of the box kite. In addition to the square type shown, you can build a rectangular box kite using the same general instructions.

One word of warning all kite fliers should remember: Never use a wire for a kite string if you are flying your kite anywhere near electric power lines. Many boys have been electrocuted when their kite strings touched the live electric cables.

What Makes It Fly?

The same principle that makes a kite fly also keeps an airplane in the air and a sailboat moving across the water. An airplane creates its own wind by its speed through the air (see Airplane).

You can "create" wind for your kite on a perfectly calm day by running with your kite across an open field. The kite lifts because currents of air, moving parallel to the surface of the ground, strike the face of the kite and try to drive it backward. If the kite were not held by the kite string, it would be whirled away and would soon fall to the ground. But the string holds it steady, with the face of the kite tipped forward. The wind pushes up on this tipped face and lifts the kite, just as a wedge pushed under an object lifts it up. In addition to this thrust from below, the rush of wind around the sides of the kite creates a partial vacuum on the upper side. This tends to "suck" the kite upward. The same effect, on a greater scale, takes place to keep an airplane in the air. The best wind for kite flying is a steady breeze. Stronger winds drive your kite down before it has a chance to rise and may even break the "skin" or frame. Rain will also keep your kite from rising.

KLONDIKE. This gold-mining district in Yukon Territory, Canada, lies chiefly to the east of the Yukon River. It was the scene of the great gold rush of 1897, when a barren waste was suddenly transformed into a busy mining region. As the rich placer deposits became exhausted the population greatly declined. The Klondike River, which gives its name to the region, is a small tributary of the Yukon. The princi-

pal town of the region is Dawson, with a population of only 783 in the 1951 census.

Modern mines work the underground deposits. The old pack trails have given way to a railway from Skagway, Alaska, to White Horse on the Yukon, the Alaska Highway, and air routes. Mean temperatures in the Klondike region range from -20° F. in December to 60° in July. (*See also* Yukon Territory.)

"In DAYS of OLD, When KNIGHTS WERE BOLD"



KNIGHTHOOD. A knight in armor would present a very strange appearance on a modern battlefield. His prancing steed and coat of mail, the heavy iron helmet which covered his head, the shield which he carried on his left arm, his lance and shining sword—all these belong to bygone days and have little place among the swift airplanes, the rapid-shooting automatic weapons, and the scorching flame throwers of modern warfare.

Knighthood flourished before the time of guns and gunpowder when battles still were won by hand-to-hand conflicts of heavy-armored knights. Fighting was almost an everyday occurrence, and the common people generally could not protect themselves against an invading foe. In times of danger they fled to the castles or strongholds owned by the nobles. To obtain protection the poorer folk became the serfs or villeins of their powerful neighbors, and those in turn were the vassals of those still more powerful. Closely connected with this feudal system, as it is called, we find the institution of knighthood.

Training of a Knight

The education of a knight began at the age of seven, when he was taken from his home and sent

to the castle of some famous nobleman, perhaps his father's lord. Here he served the lord and lady as a page until he was 14 years old. It was his duty, and he esteemed it a privilege, to accompany them at all times. He waited on them at table and went with them to the chase. He received religious instruction from the chaplain and training in arms from the squires. He was taught by his mistress and her ladies to honor and protect all women. He also learned to sing and to play the lute, to hunt and to hawk. But above all else he learned to ride a horse.

At the age of 14, he became a squire. He now learned to handle sword and lance and to bear the weight of the heavy armor. In addition to his other duties, he had now to carve at table and to accompany his knight to war. He assisted him in putting on the heavy armor. He saw to it that the knightly sword as well as other arms were polished until they shone. He stood by to give aid in conflict should his lord be overmatched; to lend his horse should the master lose his own. It was the squire who raised his knight when he fell and who bore his body away if he were wounded or killed in battle.

In the Prologue to the 'Canterbury Tales', there is this beautiful description of a squire: "His clothes were embroidered red and white, as it were a meadow of fresh flowers. All the day he was singing or playing upon a lute, he was as fresh as the Month of May. His coat was short, with long wide sleeves. Well could he sit a horse and ride, make songs, joust and dance, draw and write. He loved so ardently that at nighttime he slept no more than a nightingale. He was courteous, modest, and helpful, and carved before his master at table."

At the age of 21, if as page and squire he had well acquitted himself, the young man was made a knight. This was an occasion of elaborate ceremony and solemn vows. After a bath of purification, the candidate for knighthood knelt or stood all night in prayer before the altar on which lay the precious armor which he would don on the morrow. In the morning there was a religious ceremony, with perhaps a sermon on the knight's duty to protect the weak, to right wrongs, and to honor women. Then in the courtyard in the presence of the assembled knights and fair ladies, a knight's armor was buckled on, piece by piece, a sword was girded about his waist, and spurs were attached to the candidate's feet. He then knelt to receive the accolade. This was a blow upon the neck or shoulder, given by the officiating lord or knight with his fist or with the flat of a sword. As he gave it he said, "In the name of God and St. Michael and St. George, I dub thee knight; be brave and loyal." The ceremony was followed by exhibitions of the young knight's skill in arms.

Sometimes on the occasion of a knighting, the lord at whose castle the ceremony took place gave a tournament. This was often a very gorgeous and extravagant entertainment. Knights for miles around were invited to come and take part, while many persons of distinction came to see the events. Sometimes the visitors came in such numbers that the lodgings of the castle were filled and tents were put

up for the later arrivals. The shield with its coat of arms served as a sort of doorplate to the passersby, who when they saw a familiar device displayed, would say, "Sir Percival is within this tent."

EQUIPPING THE YOUNG KNIGHT FOR ADVENTURE



What a proud moment it must have been for the family of a young squire when the time came for him to put on the honored armor of a knight! This picture shows a "try-on," with the armorer fitting the metal "garments" with the aid of hammer and pincers. In a few days the squire will be "knighted" with elaborate ceremonies.

In the morning after attending mass, the knights would go to the tourney field or lists. Here the combats or jousts between the knights were fought. Sometimes two knights fought alone, sometimes whole companies met in combat. When all were assembled, the heralds announced the names of the contestants, and the new knight looked upon the most brilliant scene that the times had to offer. Along the sides of the field were handsome pavilions filled with beautiful ladies, gay young pages, and jewel-bedecked nobles. The knights were resplendent in shining armor, with swords like silver and golden spurs giving back the sunlight. Banners fluttered everywhere and here and there gleamed gorgeous cloth of gold.

The combats which took place in this gay setting were not gentle ones. The points of the weapons, to be sure, were usually encased in blocks of wood to make the encounter less harmful, but the sport was so rough and the knights jousted in such earnest that many were wounded and occasionally were killed. About each knight's helmet was tied the favor his lady had given him, and he fought to do her honor quite as much as to do himself credit. The joust was attended by much excitement, with the blowing of trumpets, the clash of steel, the shouts of heralds,

and the applause of the spectators; and it continued until one or the other of the knights was overcome. The defeated knight then yielded his horse and armor to his adversary and was assisted from the field by the squires.

Sometimes a tournament lasted for several days, feasting, dancing, and hawking filling the hours not given to fighting. Hawking was a sport indulged in by the ladies and the squires as well as by the knights; and almost every lady had her own hawk or falcon which when unhooded was trained to rise into the air and attack game birds (*see Hawk*).

Often during the festivities of a tournament a large pie was baked and live birds concealed inside. Then in the great hall the pie was opened, the birds flew about, and the falcons were loosed at them. This was considered great sport, and has been immortalized in the nursery rhyme—

Sing a song of sixpence, pocket full of rye,
Four and twenty blackbirds baked in a pie;
When the pie was opened, the birds began to sing;
Wasn't that a dainty dish to set before a king?

Into the Great World of Adventure

After the festivities attending the conferring of knighthood, the young knight was free to go where he pleased. Usually he rode forth in quest of adventure, armor on his back, his spurs on his heels, and with sword, shield, and lance ready to hand. As a knight-errant he sought a fair maiden in need of a champion, or a strange knight with whom to joust. Sometimes he stationed himself at a bridge or crossroad to challenge to combat any knight who happened by. He was usually sure of hospitality at any castle to which he came. After a time he might return to his father's castle or join the following of some great lord, or become one of the multitude of crusaders who journeyed to rescue the Holy Sepulcher. Whenever or however he went he took with him the three watchwords of a knight: Religion, Honor, Courtesy. The ideal knight is thus described by the poet Chaucer: "And though he was valorous, he was prudent and as meek as a maid of his bearing. In all his life he never yet spake discourteously but was truly a perfect gentle knight." But only too often, alas! knights were false to those high ideals.

With the rise of the longbow and the crossbow carrying wounds or death from a distance, and the invention of gunpowder and cannon rendering useless the frowning feudal castle, the knight in armor passed out of existence. Knighthood then came to be merely a title of honor conferred for valuable service rendered to the king or state, with the title "Sir" as its only distinction. In recent times in England, it has been conferred on eminent scholars, lawyers, physicians, artists, and civil officers, as well as on soldiers. The United Kingdom has eight of these honorary orders of Knighthood—the Garter, the Thistle, St. Patrick, the Bath, Star of India, St. Michael and St. George, Indian Empire, and the Royal Victorian Order. (*See Armor; Castle; Feudalism.*)

KNIGHTS OF COLUMBUS. This great Roman Catholic fraternal organization was founded in New Haven, Conn., in 1882 by a Catholic priest, Michael J. McGivney. Its purpose is to provide insurance for its members, to assist those who are sick and disabled, and to promote education. The association now has a branch in every state, in every Canadian province, and in Cuba, Puerto Rico, the Philippines, and the Canal Zone. The total membership is about half a million. It is governed by a supreme council, elected by the various state councils. During the first World War it contributed notably to welfare work among the soldiers at home and overseas. It has since aided employment and contributed to relief funds.

KNITTING MACHINES. Knitting is a way of looping yarn so that the loops interconnect to form a fabric. Like many other old handicrafts, it is now an important machine industry.

Hand knitting is done with a single yarn looped back and forth, or around and around, on two or more needles. The knitter catches the yarn with a needle to form new loops as she transfers rows of loops from one needle to another. Machine knitting is done with many needles, and these look more like hooks than like needles. There may be one yarn or many yarns. Yet the principle is the same as in hand knitting; that is, the yarn is *looped* into a fabric.

Because of its looped construction, knitted material is elastic and pliable. It is especially suitable for garments in which both fit and comfort are important. Stockings, sweaters, underwear, and gloves are examples. Knitted material has other advantages. It has many little air pockets. These make it warm, since air pockets are a form of insulation. They also make it absorbent and light in weight. Knitted cloth does not wrinkle easily and sometimes does not have to be ironed after washing.

Knitting Is an Old Art

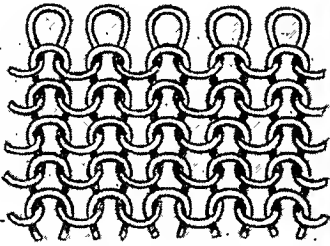
Little is known about the early history of knitting. Prehistoric people may have looped fibers into fish nets by a crude sort of hand knitting. Whatever method they used was gradually improved through the ages. By the 15th century hand-knitted garments were common in western Europe.

William Lee, a young curate of Nottinghamshire, England, made the first knitting machine in 1589. It knit stockings flat, and they had to be sewed up the back. There was a needle for every loop across the width of the stocking, eight needles to the inch. These were so arranged that they formed and gave off loops alternately.

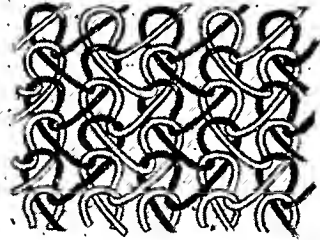
Silk Stockings for Queen Elizabeth I

Lee presented a pair of wool stockings to Queen Elizabeth I and asked for a patent on his machine. She asked him to try to make silk stockings. Perhaps she wanted the luxury of silk, but chiefly she was afraid the new machine would take work from thousands of her subjects who made their living by hand knitting wool stockings.

A KNITTING MACHINE AND HOW IT WORKS



How the loop is formed
in plain knitting



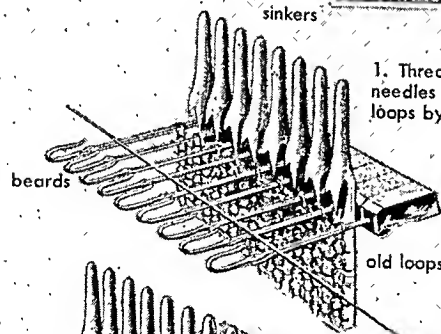
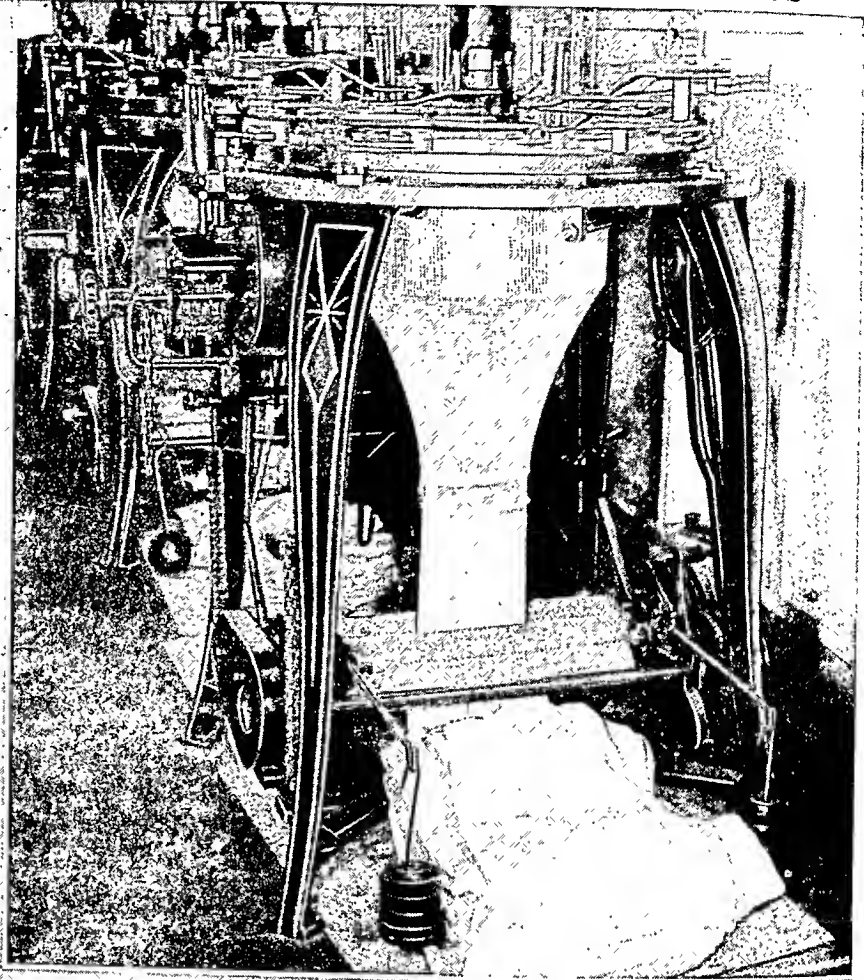
Formation of loop
in warp knitting



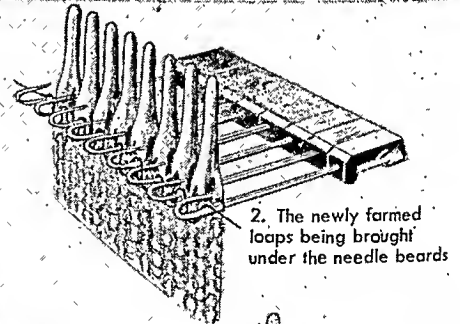
Bearded needle set in lead



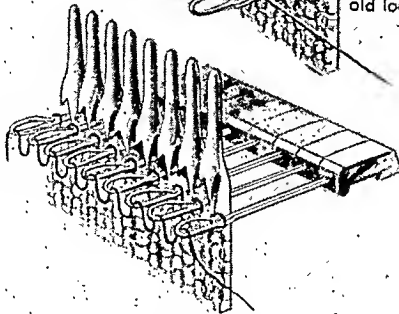
Latch needle
used in individual action



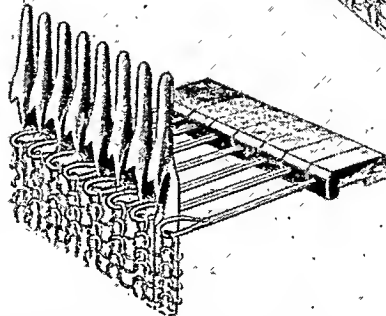
1. Thread laid over the
needles to be formed into
loops by the sinkers



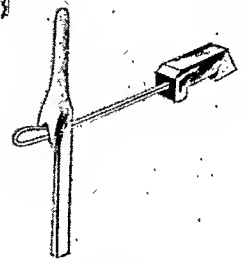
2. The newly formed
loops being brought
under the needle beards



3. The beards closed to allow the
old loops to be passed onto the top



4. The old loops pushed off the needles and
left hanging around the newly formed loops



5. Sinker closing
beard of needle

The photograph (upper right) shows a circular machine knitting tubular fabric. The drawings at the left show plain weft knitting (top), warp knitting, and two kinds of needles. The drawings below illustrate weft knitting. After the thread, or yarn, has been laid over the needles (1) the sinkers come forward and dip down to form loops in the thread. With the same movement these loops are pushed under the needle beards as shown (2) and the beards are closed. As the sinkers rise again (3) you see the old loops ready to slide over the new ones (4) and so complete the row. No. 5 shows detail of operation.

Lee built a machine that had 20 needles to the inch and so did finer knitting. With this he made the queen a pair of silk stockings. She was pleased but still could not bring herself to grant Lee a patent. He was invited to France, and it was there that the first development of machine knitting took place. Lee died before the world appreciated his genius.

Knitting Machines Today

Circular knitting machines were invented early in the 19th century. These largely replaced the flat-bed type that had been modeled after Lee's machines. They knit much faster. An improved flat-bed knitting machine appeared in 1863. This could knit wide, flat fabrics. Today manufacturers use circular or flat-bed machines according to the type of knit goods they make. They use circular machines for seamless stockings and socks and for tubular fabrics. They use flat-bed machines for flat fabrics and for flat-shaped pieces such as those that are made up into full-fashioned hosiery, sweaters, and gloves.

All knitting machines, whether circular or flat-bed, have a needle for every loop, just as William Lee's machines did. The needles are moved up and down by cams or similar devices. Their hooklike heads close as they pull newly forming loops through loops that are slipping off to form the body of the fabric or garment. Pictures on the opposite page illustrate this action.

"Warp Knit" and "Weft Knit"

There are two types of machine knitting, each done on both circular and flat-bed machines: *weft knitting* (also called filler knitting) and *warp knitting*.

In weft knitting, one yarn travels around and around if the machine is circular, or back and forth if the machine is flat, as in hand knitting. Weft knitting is more elastic than warp knitting. It is used in stockings, sweaters, and other garments. If a thread in this type of knitting breaks, a "run," or "ladder" forms. Various run-resistant constructions have been devised to meet this drawback.

In warp knitting, as many yarns are used as there are loops in the width of the fabric. These yarns travel up in loops, zigzagging so that loops directly above one another are formed by different yarns. Thus the loops are all interconnected. Warp knitting is not so elastic as weft knitting. But it is firmer and less likely to sag. It is practically runproof, and can be done in many designs. It is used to make fabrics rather than garments.

Modern, power-driven knitting machines operate so rapidly the eye cannot follow their movements. One type of flat-bed machine for warp knitting, developed in England, turns out about 58 square yards of knitted fabric in an hour. One man can operate six of the machines at once. (See also *Fabrics*.)

KNIVES, FORKS, AND SPOONS. "Fingers were made before forks, and hands before knives" is an old saying. Table knives do not seem to have come into general use in Europe until late in the Middle Ages, and in England the use of forks at table was laughed at as a new-fangled curiosity as late as 1608.

But though table knives are comparatively recent, knives for general purposes were one of the first inventions of early man. Some dating back to the Stone Age have been found, made of flint, and very similar to the arrow heads and the hatchets the Indians were using when the white man came to America. Spoons, too, have been in use a long time. In museums we often see spoons of wood, stone, and ivory which were found in ancient Egyptian tombs. The Greeks and Romans used spoons of bronze and silver, and during the Middle Ages spoons of bone, wood, and tin were common; the wealthy had spoons made of beaten silver. Forks came many years after knives and spoons, and were long used only in cooking or for holding the joint of meat while it was being carved. The first forks were two-pronged affairs, much like our carving forks, and were made of iron, bone, or even hard wood.

The use of the fork at table seems to have been introduced into Europe from the Orient through Venice. A story of the 11th century tells of the wife of a Venetian ruler who was "luxurious beyond belief," because, "instead of eating like other people, she had her food cut up into little pieces and ate the pieces by means of a two-pronged fork." When the custom of using a dining fork was brought to England in 1608 by a traveler who had observed it in Italy, it caused a great deal of excitement. He was laughed at by some, and railed at by others, one person declaring that it was an "insult to Providence, who has given us fingers." Even today forks are not used in many parts of the world. The Iranians and the Egyptians, for example, think the European method of eating very queer; and most of the Chinese and Japanese use chopsticks.

Most American cutlery is made in Massachusetts, New Jersey, New York, New Hampshire, Connecticut, and Ohio, but the United States has no great cutlery manufacturing center such as exists in England, France, or Germany. Sheffield, England, has long been famous for the high quality of its cutlery since the days of Chaucer.

The making of fine steel knives is a complicated process. In the first place the steel must be very hard, and carefully forged, tempered, and ground. Putting the knife into its handle of horn, bone, ivory, tortoise shell, celluloid, or silver, known as "hafting" the blade, is such a delicate task that it is a special trade. Silver-plated ware is made by electroplating some cheaper metal, which has been shaped and cut with dies. (See *Electroplating*.)

KNOTS, HITCHES, AND SPLICES. A scientist who wanted to test the intelligence of monkeys once cut the rope which held up the swing of his pet chimpanzee. The ape fretted and grieved over it, but it never occurred to him to mend the rope with a simple knot. Tying knots is indeed a special accomplishment of mankind. You might almost say that if you trace the thread of civilization you will find it fastened in many places with knots—from the naked savage tying a crude hook to his sea-weed fishline, to the dock-hand mooring a great ocean liner to its pier with giant hawsers.

To know how to tie knots properly saves much time and trouble, and in some cases even lives depend upon it. The sailor aloft in a ship's rigging, the cowboy roping a wild steer, the steeple-jack dangling high in the air, the lumberman balancing on a logboom—all of them know what will happen if a knot slips.

Some knots are valuable because of the speed with which they can be made. But the best knots are those that hold firmly without slipping, yet do not bind so tightly that it is hard to untie them when their work is done. Most of the simpler knots which are described below meet this requirement.

Knots

When a rope is bent in a loop, the looped part is called the *bight*. The long portion of the rope is known as the *standing part*, and the short part, used in forming the knot or hitch, is known as the *end*.

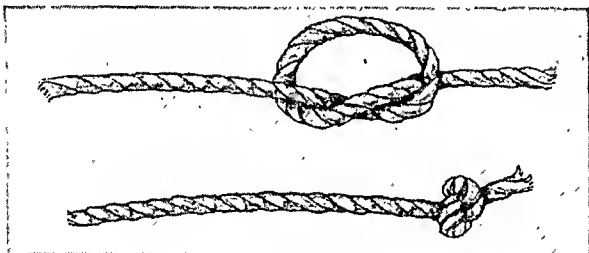


Fig. 1.—Overhand Knot

Standing part of the rope is held in the left hand and the end is passed back over it, and put through the loop just formed.

The simplest knot that is made is the overhand knot (Fig. 1). It forms a part of many other knots. It is used to keep the end of a rope from raveling, to provide a hand-hold on a halter or bell rope, to prevent the end of a rope from running through a pulley, or a sewing thread from pulling through cloth. The

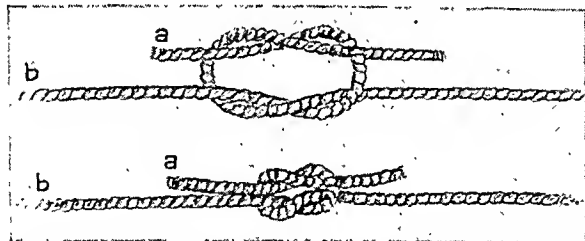


Fig. 2A.—Square Knot

The illustration shows the proper way to tie two pieces of rope together. The ropes are passed once around each other. The ends are then brought up and the process repeated, care being taken that on each side the standing part and free end (a, b) come out on the same side of the loop. When drawn tight, the free ends will lie parallel to the standing parts.

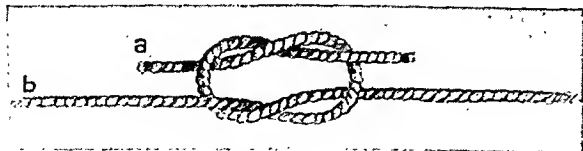


Fig. 2B.—Granny Knot

This unreliable knot results when the second twist, instead of following the square knot rule, is made in the reverse direction, so that the parts (a, b) are separated from each other by a part of the loop. When this is drawn tight the ends stick out at right angles to the knot.

square or sailor's knot (Fig. 2A) is the commonest of all knots for fastening ropes or strings together. When correctly made, it is as perfect as a knot can be, for it is reliable, and unties easily. If we tie our shoe laces correctly, we use this square knot, although the ends are not pulled clear through but are looped and drawn tight. When a square knot is tied without a single or double bow, we call it a "hard" knot. Its one disadvantage is that it will not hold so well when made with ropes of different sizes. This knot is always used when the sailor reefs the sails, for even

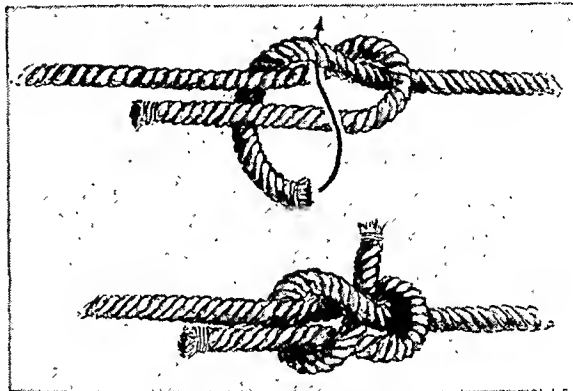


Fig. 3.—Weaver's Knot

This also begins like a square knot, but one of the ends thrust back under itself and comes out at right angles to the knot.

with stiff wet ropes it can be loosened easily by pushing the free ends back against the knot, and completely untied by pulling at the loops which appear.

Sometimes when we are tying our shoe laces we make a mistake and instead of making a square knot, we get the troublesome granny or lubber's knot, which

Fig. 4.—Running or Slip Knot

A bight is first formed and an overhand knot made around the standing part.

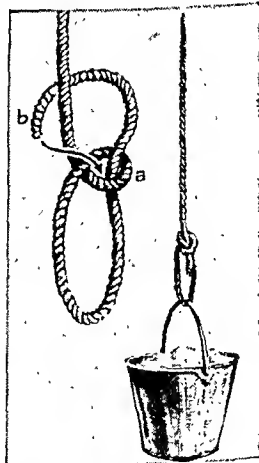
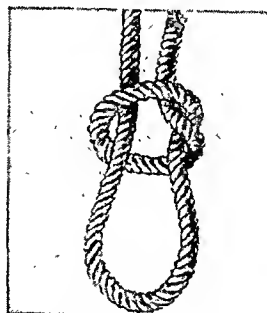


Fig. 5.—Bowline

Make a loop (a) and pass end (b) through it. Now carry the rope around the rope above the loop and then back through the loop again, and draw it tight. When tying an animal or fastening a rope to a bucket, the end (b) is first passed around the animal's neck or around the bail of the bucket, before going through the loop (a).

slips easily and gives way under a strain (Fig. 2B). Many people go through life with their shoestrings always dangling without realizing that they are making themselves much useless trouble by not learning

the difference between these two knots. The weaver's knot is another knot for tying ends of rope together (Fig. 3). Weavers use it to tie together ends of threads, as it passes smoothly through the needle. One of the simplest "eye" knots is shown in Fig. 4, and is known as the running or slip knot.

The bowline is one of the best and most useful of all the knots; indeed it is often called the king of knots (Fig. 5). It will not slip and is widely used—on the farm, in construction work, by mechanics, and in nearly every line of industry. It is the safest knot to put around an animal's neck. It is often used in fastening a rope to a bucket to hoist material, such as tools or mortar, to workmen on a scaffold. A close relative of this knot is called a "bowline on a bight" (Fig. 6). Being made with a loop or bight of the rope, it is much stronger and does not require the use of either end of the rope in tying it. With this knot a man can be lowered in safety from a great height.

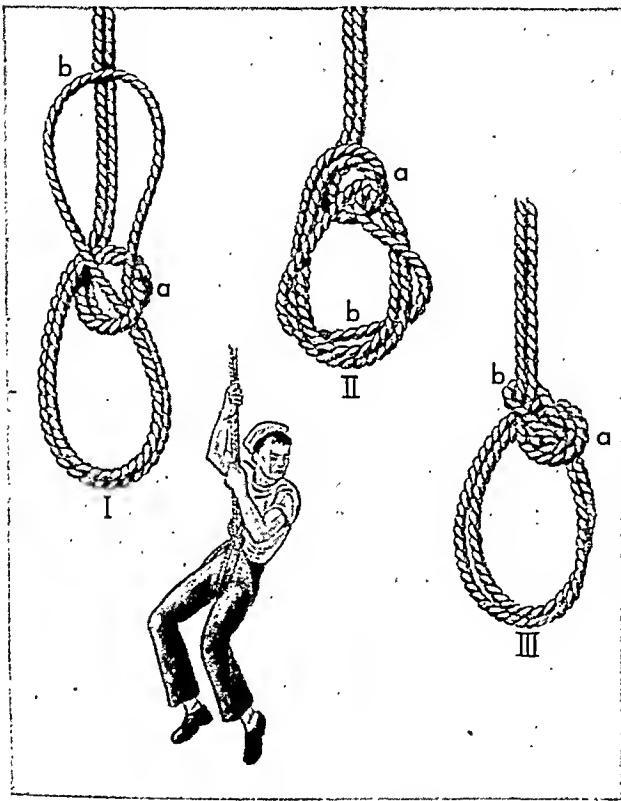


Fig. 6.—Bowline on a Bight

Make a loop (a) and pass the end of the bight (b) through it as in Part I. Now hold the loop in the left hand and pull the bight down and around the hanging part as in Part II. Now raise the bight (b) up above the loop (a) and draw it down tight as in Part III.

The bowline on a bight is frequently used aboard ship for this purpose when it is not practical to rig a more comfortable sort of sling.

Hitches

Although there is no sharp distinction between knots and hitches, the name "hitch" is usually applied to those temporary devices which are not, as the sailors say, "made fast." A knot is thus the more permanent fastening. Another difference is that a

knot may be made in the rope itself without requiring anything else for its security. A hitch, on the other hand, usually takes the form of self-binding loops around some solid object, and will come loose as soon as the strain is removed. The sheepshank is the most practical and satisfactory way for shortening a rope without cutting it and many times this hitch proves of use to sailors (Fig. 7).

The halter hitch has many uses, the most common one being to fasten the halter ropes of horses or cows to the manger or to a post or hitching ring (Fig. 8). When a halter hitch is properly made, it will slip tight, and therefore should never be used around an animal's neck. An even better halter tie is shown in

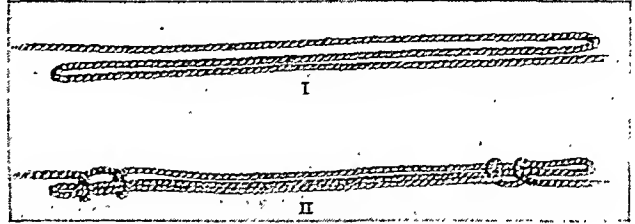


Fig. 7.—Sheepshank

Fold rope back on itself forming a double loop of the required length (I). Then weave a clove hitch (Fig. 11) with the standing part of the rope over each end of the double loop (II), and draw tight.

Fig. 9. This is called the "figure eight" tie, and no matter how tight it has been drawn by the animal, it can easily be untied by jerking the loose end of the rope.

The clove hitch, the best known of all the hitches, is easy to make and the harder the pull against it the tighter it holds. The foundation of it is the *half-hitch* (Fig. 10, I). It is, in fact, sometimes called the "double half-hitch." It will serve well as a fastening whenever the rope is to have a constant and steady

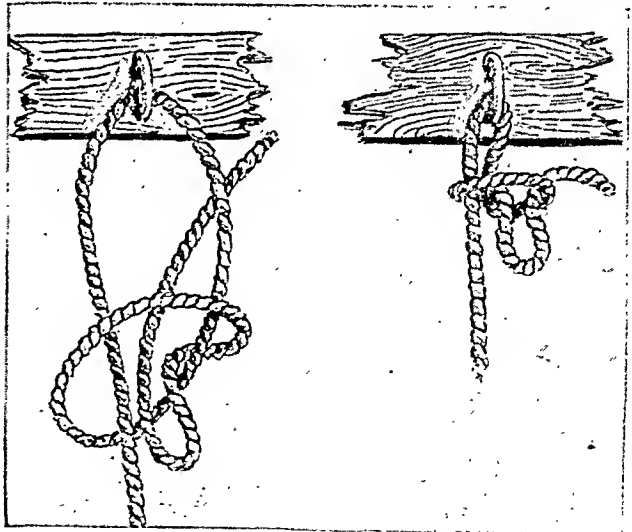


Fig. 8.—Slip Knot Halter Tie

Put end of halter rope through ring or hole in manger, then tie a slip knot as in Fig. 4, except that the end of the rope is not pulled all the way through, but is left to form a loop.

strain upon it. It is always easy to loosen it, even

when made with a hard wet rope. In Fig. 11 the clove hitch is used to make a running noose.

Splicing a Rope

Few people know how to splice a rope, yet a knowledge of splicing is valuable in many ways. A

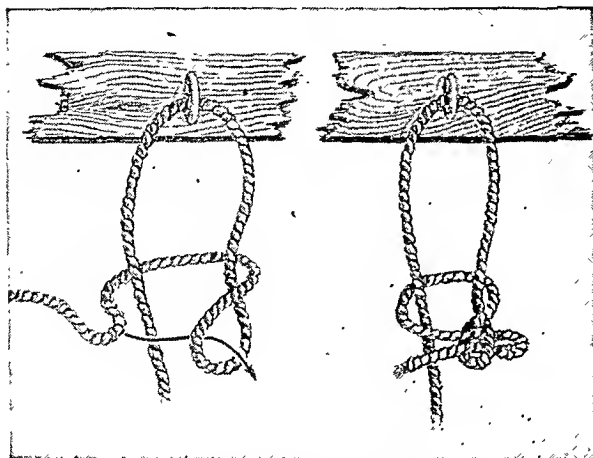


Fig. 9.—“Figure Eight” Halter Tie

The difference between this knot and plain halter tie lies in the extra twist given the first loop, before the second loop passes through it.

worn or broken rope can be neatly mended by this means, and a good splice is always stronger than a knot. Splicing is necessary if the rope is to pass through pulley blocks where knots cannot be used.

The simplest type of splice is the short splice. In making this the strands of each rope are spliced into the strands of the other rope. First the strands

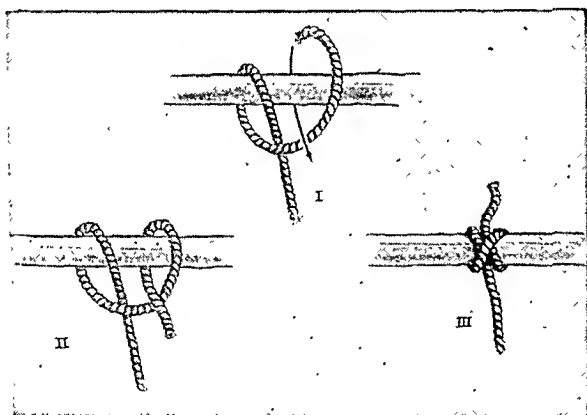


Fig. 10.—Clove Hitch

To put the clove hitch on a stake or other support, the top of which can be reached, make a half-hitch or loop (I), passing the right hand part of the rope under the left. Now hold the first loop in the left and make another one exactly like it with the right (II). Now slip the right hand loop over the left hand loop, and drop the two loops over the stake, drawing them tight. When the clove hitch is put around a tree or high pole, the end has to be passed around and woven under and over to get the same effect.

of each rope are “unlaid” or untwisted as shown in Fig. 12. Then they are brought together so that strands *a*, *b*, and *c* of one rope alternate between strands *d*, *e*, and *f* of the other rope. When they have been pushed together as far as they will go (II) they may be tied with a string to hold

them in place during the remainder of the operation. Taking one of the strands (*a*, III), it is passed over the twisted strand nearest to it and under the next to it. The same thing is done with strands *b* and *c* in one direction and with *e*, *d*, and *f* in the other direction. The process is repeated (IV) until all the six loose strands have been woven over and under into the solid body of the rope. Care must be taken that the strands do not unravel during splicing. The short splice makes the joint double the thickness of the rest of the rope. In splicing Manila rope, a pointed wooden peg, or *fid*, is used to make the openings between strands. (For wire rope a metal-tipped *marlinespike* is used.)

The eye splice is made the same way as the short splice, except that the end of the rope is woven back

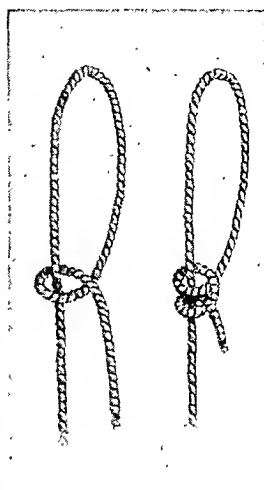


Fig. 11.—The Clove Hitch Slip Knot

In this knot the rope is looped over and a clove hitch is made around the standing part.

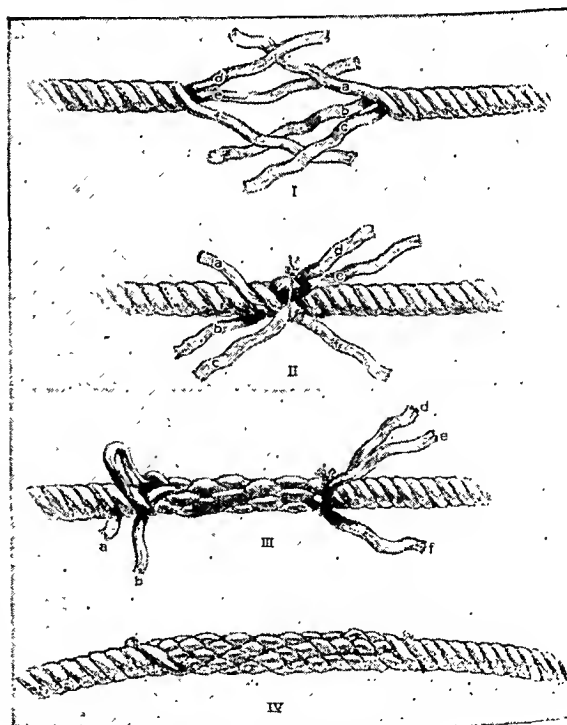


Fig. 12.—The Short Splice

into itself, forming a loop, or “eye” (Fig. 13). The rope is untwisted for six or eight inches, and the untwisted ends are doubled back against the main part of the rope to form a loop of the size desired (I).

Each of the loose ends is then passed over the nearest strand and under the next (II) until the splice is completed (III). Here, as in the short splice, the loose ends are woven around in the reverse direction from the twist of the body of the rope.

KNOX, JOHN (1513?-1572). The leader of the Protestant Reformation in Scotland was stern John Knox. For years this gaunt preacher lived in exile or was hunted as an outlaw at home. Courageous and dogmatic, he finally established Presbyterianism as Scotland's national church. Then as chief minister of the new faith he thundered against his Catholic ruler, Mary Stuart. She was finally deposed, and Knox knew his church was safe.

Knox was an obscure tutor when he became violently involved in church reform in 1546. At the time, Scotland was a Catholic nation; but many were angry at church abuses. Knox was a follower of George Wishart, a Lutheran reformer. When Cardinal Beaton had Wishart burned as a heretic, a mob killed the cardinal and occupied his castle. Knox joined the castle garrison and began teaching the gospel. Soon the leaders called upon him to be preacher.

In July 1547 the Catholics regained the castle with French help, and the defenders were held prisoners in French galleys. In February 1549 Knox was released, probably at the request of the new boy king of England, Edward VI. He preached in England until Edward died in 1553. Edward's Catholic half sister, Mary Tudor, succeeded him, and Knox sought safety in Germany. Later he was pastor of an English congregation in Geneva, Switzerland. There he became a student of the Protestant leader, John Calvin (*see* Calvin).

By 1559 Scotland was ready for the new doctrine. Knox returned home; and his preaching soon roused the people to wreck churches and monasteries. In 1560 the Scottish Parliament established Presbyterianism as the national faith. Thereafter Knox devoted himself to

strengthening the new church. He spoke out against Mary Stuart from the pulpit and in private interviews with her. She tried to win him over, but he remained unmoved. In 1567 her own conduct brought her downfall (*see* Mary Stuart, Queen of Scots). Knox died five years later, on Nov. 24, 1572.

Little is known of Knox's early life. Probably he was born at Giffordgate in Haddington, the son of a well-to-do peasant. He may have entered Glasgow University, but he was never graduated. He was admitted to minor orders in the Catholic church; but he had turned to tutoring by

1546. He was married when he was about 48 and had two sons. When his wife died he remarried at 59 and had three daughters.

KNOXVILLE, TENN. The industrial city of Knoxville prospers because of the nearness of raw materials and because it is the center for a vast recreational area. Cotton and tobacco are grown in the fertile Tennessee Valley, and marble is quarried and coal mined nearby. About 20 miles west lies Oak Ridge, a center for atomic research and production. Great Smoky Mountains National Park begins 35 miles southeast, and nearby are some of the beautiful lakes formed by the dams of the Tennessee Valley Authority.

Knoxville is located in east-central Tennessee, just four miles below the point where the Holston and

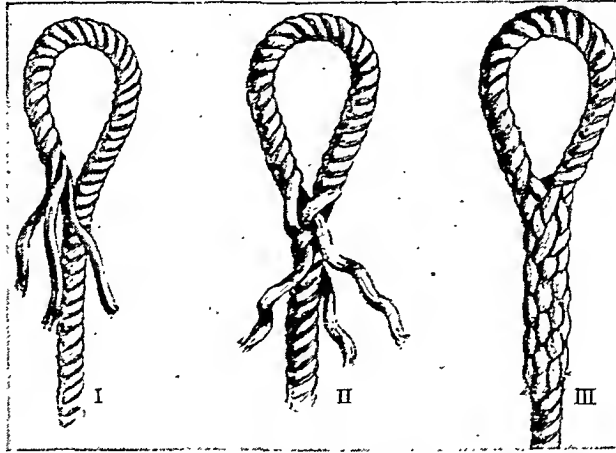
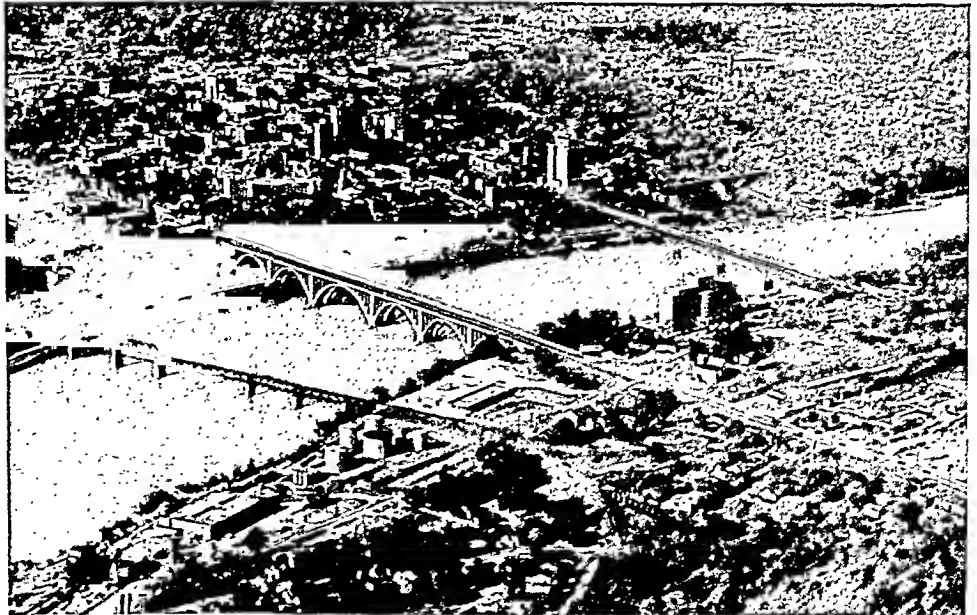


Fig. 13.—The Eye Splice

KNOXVILLE, A CENTER OF INDUSTRY AND RECREATION



This air view looks northwest across Knoxville, one of the chief cities of Tennessee. It stands at the head of navigation on the Tennessee River. The part of the river shown here is called Fort Loudoun Lake, one of a series made on the river by the TVA. The lakes are a favorite resort area.

French Broad rivers join to form the Tennessee River. The city is a wholesale- and retail-trade center for a large area and the headquarters for the Tennessee Valley Authority (*see* Tennessee Valley Authority). Great tobacco auctions are held in Knoxville from December to March. The city's industries produce marble, textiles, metal goods, chemicals, and plastic and wooden articles.

The University of Tennessee was established here as Blount College in 1794. The Knoxville College for Negroes opened in 1875. Blount Mansion, the first frame structure west of the Alleghenies (now a museum), and the log Chisholm Tavern were erected in 1792. The McClung collection of Southern historical materials is housed in the Lawson McGhee Library.

Knoxville's first settler, James White, built a log fort on the site in 1786. The town was named for Gen. Henry Knox, President Washington's secretary of war. From 1792 to 1796 it was the capital of the "Territory South of the River Ohio" and then of the state until 1812. Knoxville's first rail line, from Chattanooga, reached the town in 1855. Knoxville gained population steadily after the Civil War and rapidly in the 1900's.

Water, gas, and electricity supplies are municipally owned. In 1948 the city adopted the mayor-council form of government. (*See also* Tennessee.) Population (1950 census), 124,769.

KOCH, ROBERT (1843-1910). A German country doctor helped raise the study of microbes to the modern science of bacteriology. By painstaking laboratory research, Robert Koch at last demonstrated how specific microbes cause specific diseases.

Robert, a thin, wiry boy, was born Dec. 11, 1843, in Clausthal, a mining town in the Harz Mountains. As a boy he studied geology and made collections of minerals, plants, and small animals. He dreamed of being a great explorer. In 1862 he entered the university at Göttingen and began the study of medicine. He hoped to explore as an expedition doctor. After

graduation, Koch interned at a hospital for the insane in Hamburg. In Hamburg he met and married Emmy Fraatz. Emmy wanted a safe, settled life. So he buried his dreams and became a country doctor.

Koch began studying bits of matter through a magnifying glass. He wanted a microscope. By much scrimping, Emmy managed to buy one for his 28th birthday. Koch began his study of anthrax. He identified and raised cultures of anthrax microbes. With these cultures he gave the disease to well animals. His work took four years. When he brought the results be-

fore the scientists of the University of Breslau, his proofs—the first of their kind—were undeniable.

For a time Koch went back to his country practice. In 1880 he was appointed a member of the National Health Department. In 1882 he isolated the tubercle bacillus. The next year he became head of a commission to study cholera in Egypt and India. He announced the discovery of the cholera microbe in 1883.

Germany acclaimed him. The spare, bearded little man was given \$25,000 and made director of a great institute to pursue his researches. In 1890 he announced tuberculin. This substance was first thought to be a cure for tuberculosis, but it is now widely used to detect the presence of the disease. He followed this discovery with other investigations of tuberculosis. Koch went on to study tropical diseases in East and West Africa. In 1905 he was awarded the Nobel prize in medicine. Koch died of a heart attack on May 28, 1910.

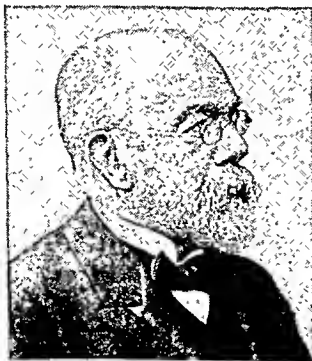
KORAN. On the Koran, the sacred book of the Mohammedans, is based the religion of about 225,000,000 people. The name means "the reading," or the book to be read. It is used in public worship, is the chief textbook in Mohammedan schools, and is the standard of all law and practice among devout Mussulmans.

The Koran is regarded by the Moslems ("the faithful") as the word of God revealed to the prophet Mohammed, through the angel Gabriel. Its various parts were written down from the prophet's lips, from time to time, by the prophet's scribes on dried leaves, bits of leather, whitened shoulder blades of sheep, or whatever else was at hand. After the death of Mohammed these fragments were gathered together, copied, and arranged roughly in the order of their length without regard to content. Thus the book has "neither beginning, middle, nor end." The original writings were then destroyed.

The Koran, which is written in Arabic, is about as long as the New Testament and is divided into 114 *suras*, or chapters. Each of these begins, "In the name of God, the merciful and compassionate." The book consists of history, legends, prophecies, moral precepts, and laws. The histories are chiefly about Old Testament characters, and many of the doctrines and laws are the same as those of Judaism or of Christianity. Moses, Jesus, and Mohammed are named as the greatest of the prophets sent by God to lead mankind in the path of truth.

The fundamental doctrine is the oneness of God, expressed in the simple statement, "There is no God but God (Allah)"; and submission to His will (Islam) is the highest virtue. Much emphasis is laid also on the Last Judgment, when everyone shall receive reward or punishment for his deeds. The faithful Moslem is commanded to pray five times a day, turning his face toward Mecca, to fast at stated times, to give alms, and to make at least one pilgrimage in his lifetime to Mecca, the sacred city. Both civil and criminal laws of Mohammedanism are based on teachings of the Koran (*see* Mohammed).

ROBERT KOCH



Koch made pioneer studies in disease bacteria.

Once the "LAND of MORNING CALM"



Korea is a rugged land of mountains, rivers, and narrow rich valleys. Here the Nakdong River flows past a small market town in South Korea. Paddy fields and crops of barley stand green around the town. The mountains and woodlands shelter deer, bear, fox, tiger, marten, otter, and beaver. Pines and chestnuts grow in the uplands. Fruit trees bloom in the valleys.

KORE'A. In 1950 the ancient land of Korea became a battlefield of Communism and democracy. When Communist North Korea invaded the Republic of South Korea, June 25, 1950, the United Nations undertook to defend South Korea. The United States led the defense. At that time Korea was almost unknown to most people. Yet that small Asiatic peninsula had been a free and cultured nation for centuries until Japan seized it in 1910. It was freed after the second World War but was occupied by Russia in the north and the United States in the south.

Today Korea is a backward land. But its heritage is rich. Its ancient name is *Chosen*, meaning "land of morning calm." Three thousand years ago it had a rich culture, stimulated by China. Japan borrowed Korea's literature and Buddhist religion. In the 16th century a Korean admiral built ironclad ships, propelled by oars, and destroyed a Japanese fleet. Later, as a protection against Japanese infiltration, Korea shut its frontiers to foreigners for 250 years and became known as the "Hermit Kingdom."

A Mountainous Peninsula

The Korean peninsula points toward Japan, thrusting out from the mainland of Asia between the Sea of Japan and the Yellow Sea. In the north, Korea is separated from Manchuria and Siberia by the Yalu and Tumen rivers. The east coast has few good harbors. In the west and south the coast is irregular, fringed by estuaries and islands; but the rise and fall of the tides in the Yellow Sea—in some places about 30 feet—make navigation difficult.

Korea is little larger than Kansas. The peninsula extends from north to south about 600 miles, in about the same latitude as the area from Maine to North Carolina. Except for hot, humid summers the climate

Extent.—North to south, 600 miles; east to west, 135 miles. Area, 84,738 square miles. Population—South Korea, 20,188,641 (1949 census); North Korea, 9,102,000 (1949 est.).

Natural Features.—Diamond Range and others; highest peak, Paektu san (8,900 feet). Principal rivers: Yalu, Tumen, Han, and Nakdong.

Products.—Rice, barley, and other grains; beans, cotton, tobacco, silk; cattle; gold, copper, iron, coal, and graphite; whale and fish.

Principal Cities (1949 est.).—Seoul (capital, South Korea, 1,446,019); Pusan (473,619); Pyongyang (capital, North Korea, 342,551); Taegu (313,765); Incheon (265,767); Mokpo (111,128).

of South Korea is moderate. In North Korea the winters are bitter, with five months below freezing. The annual rainfall is about 36 inches, most of it falling between April

and July during the summer monsoon. In the rainy season the roads often become mires.

About three fourths of Korea is mountainous or hilly. In the north some peaks, notably Paektu san ("White Headed mountain"), rise over 8,000 feet. The Diamond Range runs down from the north near the east coast throwing off spurs to the south and west. The coastal plain in the east is narrow but fertile. Between the western spurs lie rich, narrow valleys.

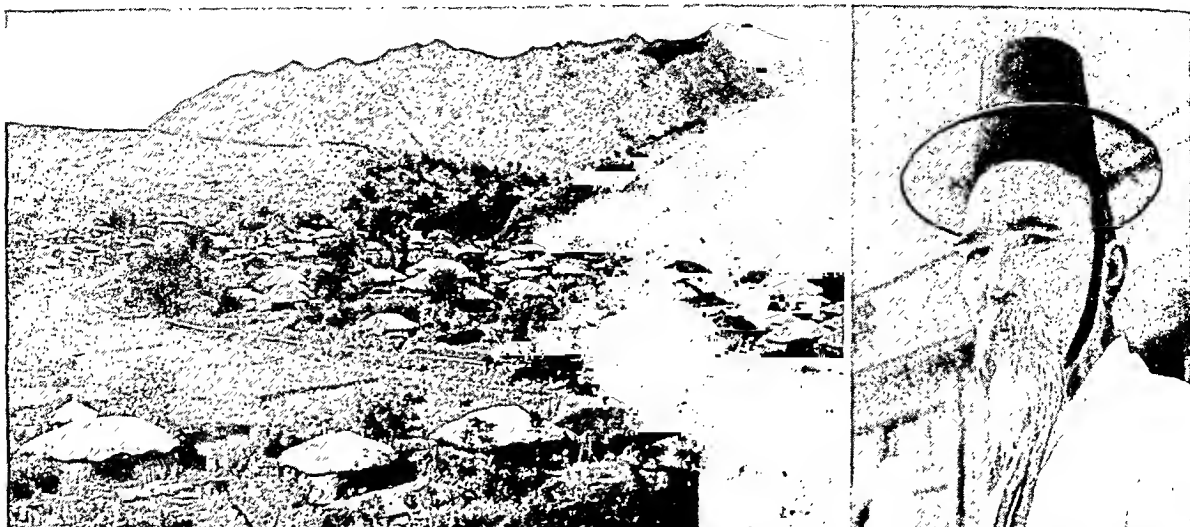
How the People Live

Only about a fifth of the total area can be farmed, yet some four fifths of the people are farmers. They scratch out a living from little plots that average four acres. About a third of the cropland is in rice. The rest is planted chiefly in barley, potatoes, wheat, soybeans, millet, tobacco, cotton, and mulberry trees for silkworms. The daikon, or Japanese radish, is the chief kitchen garden vegetable.

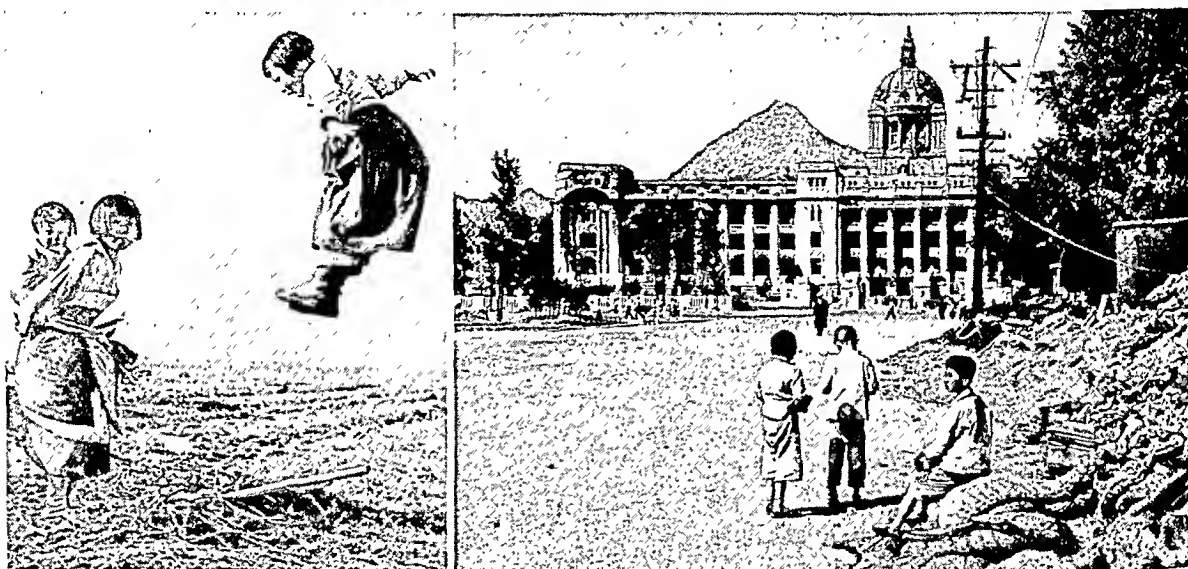
Most of the people live in farm villages, which range in size from as few as 60 persons to 300 or more. The average family has six people. Their home is a hut of clay and thatch, roofed with straw. From the clay floor of the kitchen runs an underground flue to heat the bedroom and its sleeping mats. The dining room is also the parlor. Instead of chairs, it has thin cushions and straw mats.

The women boil the rice or barley in iron pots and ladle it with a gourd into brass bowls. Vegetables and soy sauce, or pepper mash, cover the grains. Koreans seldom have fish or meat. Most of the people wear straw or paper sandals and cotton clothes. In winter they put on layers of quilted cotton. The

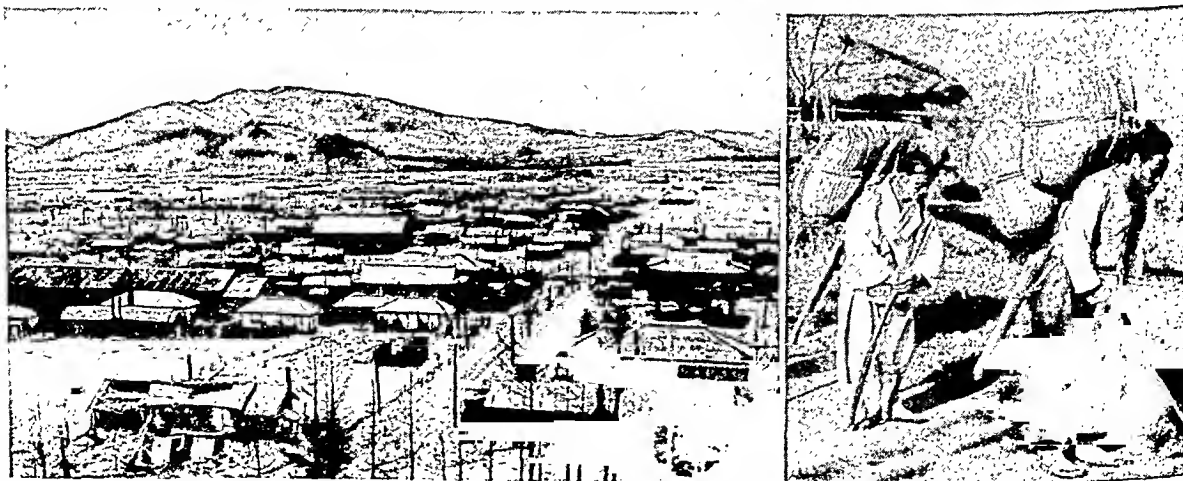
THE PEOPLE OF KOREA AND THEIR HOMES



Unlike Chinese village houses, those of Korea (left) do not have walls. The hard clay front yard, called the matang, is the social meeting place. Vegetable gardens and cotton fields lie beyond. This elder (right) wears the traditional horsehair hat.



These girls (left) are bouncing the Korean form of a teeter-totter. Korean youngsters also love to sing, dance, swim, skate, spin tops, and fly kites. Refugee boys (right) stare at the rubble of battle-harassed Seoul, capital of the Republic of South Korea.



The factory town of Hagaru (left), near the Chosin Reservoir in industrial North Korea, was taken by the Marines in the bitter snows of 1950. Porters like these (right) carry most of Korea's goods. Notice the wooden A-packs strapped to their backs.

traditional color of Korean clothes is white, but an increasing number of people now wear darker garments.

Korea's Long History

The first Korean dynasty, founded in 1122 B.C., lasted almost a thousand years. In the 4th century the Koreans took up Buddhism and began to imitate Chinese ideas and culture. From 1592 to 1598 the Japanese pillaged the land. Embittered, the Koreans shut their country to all foreigners. Not until 1876 was Japan able to force Korea to open its ports to trade.

China, Japan, and Russia coveted Korea. The Sino-Japanese War (1894-95) gave Japan control; but Russia, by diplomacy, dominated Korea until the Russo-Japanese War (1904-5). The treaty guaranteed Korean independence, but in 1910 Japan annexed Korea and in 1919 incorporated it into the Japanese Empire.

Korea was developed by Japan into a "rice bowl." Irrigation, fertilization, and seed selection doubled the crop. The bulk of the rice was sent to Japan and Koreans were left hungry. Between winter and

spring many farmers were forced to search for edible weeds, roots, and bark on the hillsides. Most of the farms passed into the hands of Japanese owners.

Japan developed some industry and trade and took almost all the exports. The once richly timbered areas were reforested with pine, oak, chestnut, and evergreens. Paper mills were built. Beds of coal and iron and rich gold mines formerly owned by British and Americans helped to supply Japan's needs. Silver, lead, tungsten, molybdenum, and copper were also mined. A series of dams and power plants built on the Yalu River furnished electric power for industries, notably fertilizer and munitions. About 4,000 miles of railway and 19,000 miles of roads threaded the country. Airlines linked Seoul, the capital, with other centers.

But Korea shared little in these improvements. Japan dominated trade and industry. It provided few schools and tried to stamp out national spirit. Koreans were ordered to take Japanese names and forbidden to talk their native language, celebrate their holidays, or wear festival costumes. In 1940 a law deprived Christian missionaries of foreign financial support, forcing them to stop their work. The schools taught Shinto religion, venerating Japan's emperor.

THE ANCIENT LAND OF KOREA



The 38th parallel cuts Korea in half. Nearly all the industry lies in the north. But three fourths of the people live in the agricultural south.

After Japan's defeat in the second World War, Korea looked for quick liberation under the Cairo Declaration of 1943. But Russia and the United States occupied Korea. For reasons not then explained, they divided it at the 38th parallel. The Russian zone (North Korea) held most of Korea's industries. The American zone (South Korea) was largely agricultural, but it held Seoul and almost 75 per cent of the population. The economy of Korea was thus almost hopelessly split.

The United States aimed to reunite the country with a provisional national government. Russia refused to cooperate. It isolated North Korea.

American Zone Nears Self-Rule

In 1946 the United States aided the Koreans in the American zone in establishing a native assembly. It was the first step toward self-rule.

In 1947 the United Nations ordered an election held in 1948 to unify Korea. But Russia banned voting in North Korea. Then in 1948 Russia encouraged North Korean Communists to proclaim all Korea a

People's Republic, with Pyongyang as capital. In reply, the United States helped South Korea to form the Republic of Korea. The United States military government ended in 1948. In 1949 all American armed forces withdrew, except a small military mission which trained the South Korean defensive army.

Communist powers in Asia almost encircled South Korea. To support it against possible attack, the United States allocated economic aid and pledged shipment of arms. But little was sent.

Communist Invasion Launches Hostilities

In 1950, at dawn on June 25 (Asiatic time), the armed forces of Communist North Korea smashed over the 38th parallel at several points, invading the Republic of Korea (South Korea). The United Nations, which sponsored South Korea, issued a cease-fire order. The Communists refused. They stormed southward, launching a conflict that was to last over three and a half years, taking hundreds of thousands of lives and devastating much of all Korea.

The United Nations, fearing that the North Korean assault might lead to world-wide Communist aggression, sought to halt the invasion by "police action"; that is, the UN did not declare war, but empowered its members to send armed forces to defend South

Korea. General MacArthur of the United States Army became commander of the UN forces—the Allies.

American air, naval, and ground forces led the way. In June–July 1950, they went into action, joining the ROK—the armed forces of the Republic of Korea. Later, 15 other members of the UN sent token combat units.

The Conflict's Course

The struggle became bitter, with tragic reverses for the Allies, who also suffered a deep feeling of futility. At first, the heavily armored North Koreans routed the ill-equipped ROK and the raw American troops. The Americans had been stationed in Japan as an occupation force, and few had been in battle. Most of them were young. They were further hampered by lack of combat training, inferior weapons, and South Korea's tiring heat.

The North Koreans drove the Allies into a tiny defensive perimeter based on the port of Pusan. There the Allies held, aided by naval and air bombardment.

Apparent Victory Smashed by Chinese Reds

After an American sea-borne force landed behind the North Korean lines at Inchon, the Allies swept back, driving the North Koreans to the Manchurian border. Victory seemed at hand. MacArthur, in November, declared that the troops "will be home for Christmas."

That same week, however, "volunteer" Red China troops attacked in force. Swarming across the Yalu from Manchuria, they split the thin Allied forces. Savage cold weakened the retreating Allies.

In 1951–53 the struggle became a disheartening seesaw. Early in 1951 MacArthur declared it would be a stalemate unless the Allies were permitted to attack Red bases in Manchuria. The UN, however, feared such action might bring Russia into the conflict on the side of North Korea and Red China. MacArthur was removed and was succeeded by other American generals (see MacArthur; Truman).

Truce Talks Begin 1951—End 1953

In July 1951 the Reds agreed to discuss a truce. The talks began at Kaesong, then shifted to Panmunjom. They dragged through two years as the Allies steadfastly refused to return prisoners against their will. Meanwhile Syngman Rhee, aged president of the Republic of Korea, protested against any pact that did not unite all Korea as a democracy. He defiantly released prodemocratic North Korean prisoners and threatened to "go it alone" with his ROK forces. The United States dissuaded him and, on July 27, 1953, the truce was signed. It provided for the voluntary repatriation of prisoners. (For a chronology of the Korean conflict, for the UN partici-

A BOUNDARY AND ITS TRAGIC RESULT



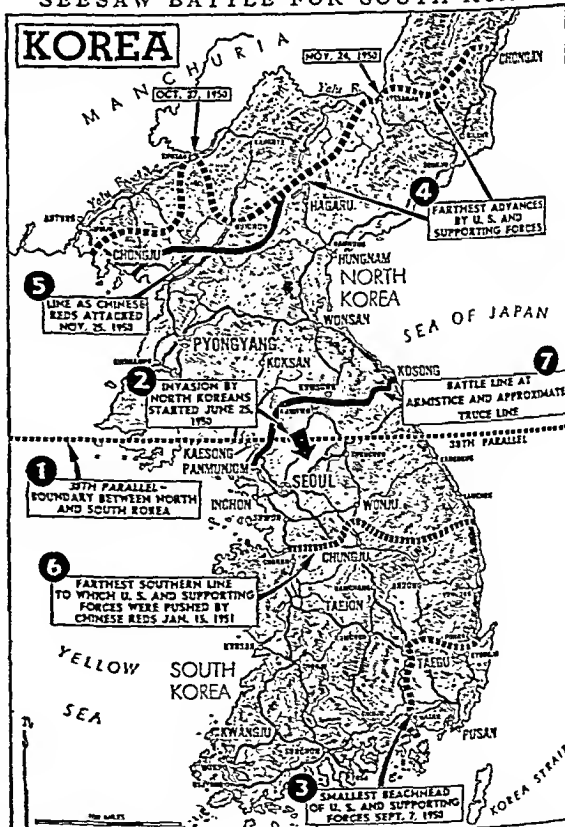
A United States soldier (above) looks grimly at a post marking the 38th parallel that divided Korea. When Communist North Korea's forces crossed it in 1950 South Korean families (right) fled helplessly before the Red invaders.



pants, and for the casualties on both sides, see the table under the entry Korea in the FACT-INDEX.)

In the Korean conflict, the United States provided 90 per cent of the Allied forces; 15 other UN mem-

SEESAW BATTLE FOR SOUTH KOREA



The sequence of numbers on this map shows where the conflict began and how it surged back and forth. Note the truce line. It gave North Korea 850 square miles below the parallel; South Korea, 2,350 above.

bers, 5 per cent; the ROK, 5 per cent and many civilian carriers of munitions and supplies. The American armed personnel totaled about 1,600,000.

South Korea had suffered greatly. From 1,000,000 to 1,500,000 civilians had lost their lives; some 100,000 children were orphaned; about 700,000 homes

were destroyed; and nearly half the people were made almost destitute. The United States and UN immediately undertook to rehabilitate the stricken nation but were handicapped by the Korean lack of experience in business and industry. Efforts to write a peace treaty in 1954 were blocked by Red China.

REFERENCE-OUTLINE FOR STUDY OF KOREA

THE LAND AND THE PEOPLE

- I. Location and size K-64a: location in world, map W-205; in Asia, maps A-406, C-259; political divisions, map K-65
- II. Land structure and climate K-64a
- III. How the people live K-64a-65, pictures K-64b
- IV. Resources and products K-65, list K-64a
- V. Principal cities: Seoul (South Korean capital), Pyongyang (North Korean capital), Pusan, Taegu, and Inchon (Fact-Index)
- VI. Government K-65: flags of North Korea and South Korea F-137, color pictures F-135; Syngman Rhee (Fact-Index)

HISTORY

- I. General K-64a, 65-7. See also the Reference-Outline for History (Current Events)
- II. Independence recognized by China C-280
- III. Russo-Japanese War and Japanese domination R-296, K-65, map J-297
- IV. Occupation by the United States and Russia after World War II K-65

- V. Struggle between United Nations forces and North Korean and Chinese Communists K-64a, 65-7, U-242, U-394-394b, 395. For chronology of Korean conflict, see Korea table in Fact-Index
- VI. United States transfers frigates and PT boats to South Korean navy in 1954, pictures H-377

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KOSCIUSKO (*kōs-ŭ-ŭs'kō*), THADDEUS (1746-1817). This gallant Polish general fought for freedom on two continents. In 1776 he came from Warsaw to serve in the American Revolution. He became an engineer and a colonel of artillery in the Continental army and built the first fortifications at West Point. After the war he was rewarded with the thanks of Congress, the rank of brigadier general, an extensive grant from the public lands, and an annual pension.

Poland meanwhile was suffering from external aggression and internal anarchy. Kosciusko returned to fight valiantly but unsuccessfully at Dubienka and elsewhere (1792) against the Russian invasion which preceded the second partition (1793).

When a great popular uprising broke out in 1794, Kosciusko became dictator and commander in chief. His victory at Racławice was won in part by peasant forces armed only with scythes and pikes. His engineering skill successfully defended Warsaw against siege by the combined Russian and Prussian armies. The defeat of his army of 7,000 Poles by 16,000 Russians at Maciejowice (Oct. 10, 1794)—where Kosciusko was seriously wounded—ended Poland's chance of withstanding its powerful neighbors.

Kosciusko was released from a Russian prison in 1796. He revisited America and lived for a time in Philadelphia. Unlike many Polish patriots, he refused to serve under Napoleon Bonaparte. He spent most of his remaining life in Switzerland, where he died in

1817. His statue stands in Washington, D. C., with those of Generals Lafayette, Pulaski, and Steuben, in a public park before the White House. (See Poland.)

KOSSUTH (*kōs-uth'*, Hungarian *kō'shut*), LOUIS (Hungarian LAJOS) (1802-1894). Hungarians cherish the memory of Kossuth as the fiery revolutionary who led a revolt against their hated Austrian rulers in 1848. Kossuth belonged to one of the poorer noble families of Hungary. He was a brilliant lawyer, orator, and journalist. For years he had sought greater freedom for Hungary, which Austria then regarded as little more than a province. His liberal publications, many written as letters to avoid censorship, angered the Austrian Hapsburg monarchy. In 1837 the royal government imprisoned Kossuth for treason.

People protested so widely that he was released in 1840. He became leader of the Liberals and a member of the Hungarian Diet. His savage political attacks on the feudal rights of nobles led to the abolition of serfdom in Hungary (see Hungary).

In March 1848, inspired by the revolution in Paris, Kossuth demanded parliamentary government for Hungary. When it seemed that Austria would try to end the freedom movement by force, Kossuth rallied the Hungarians to rise "in self defense." He became virtual dictator of Hungary, declaring the country independent of Austria, April 19, 1849.

His rashness and egotism, however, alienated other Hungarian leaders. He also lost the support of the

South Slavs. His revolutionary forces were defeated, and he fled to Turkey. Austria demanded that he be returned for execution, but the United States and England persuaded Turkey to refuse. In 1851 an American warship took him to France.

He visited the United States, where he spoke eloquently for Hungarian independence. In 1852 he went to England, where he stayed for most of the next 17 years. When Hungary was reconciled with Austria in 1867, Kossuth refused to return under the general amnesty. He died in Turin, Italy—a voluntary exile.

KURDS. For some 4,000 years the fiercely brave and proud Kurds have held to their love of liberty. These people of Indo-European stock fought the Sumerians, Assyrians, Persians, Mongols, Crusaders, and Turks. A great Kurdish leader was Saladin (*see* Saladin). Gradually they withdrew into the fortresslike mountains and sheer valleys of the Iranian plateau, where most of them live today. Their rugged region, called Kurdistan, spreads over an area where four nations meet—Iran, Turkey, Syria, and Iraq. Many Kurds also live in the Caucasus region of Russia. The total number of Kurds, in all the many tribes, is estimated at 2½ to 4 million.

They are Mohammedans. Their many dialects stem from the Iranian language. Strong, browned, and usually fine-looking, they dress in homespun. The turbaned men wear baggy trousers gathered at the ankle for ease in riding. They are superb horsemen. Nearly every man carries a long, curved Kurdish knife in his sash and usually a rifle slung to his saddle. They are daring raiders. A tragic chapter in Kurdish history was their slaughter of Armenians, instigated by Turkey after World War I (*see* Armenia).

Many Kurds are nomads, taking their horses, sheep, and goats to mountain pastures in summer and returning to valley villages in winter. Most of them farm, however—even the mountaineers. They chiefly grow tobacco, fruits, rice, wheat, and barley. Their hospitality is unequalled, even though their homes are only felt tents, or of mud brick, or stone and wood.

Time and again the Kurds have asked to become a nation. In 1945 Communist-led Kurds set up a "people's republic." Iran regained control in 1946, but sporadic rebellions and raids followed.

KYOTO (*kyōtō*), JAPAN. For over 1,000 years the capital of Japan was Kyoto. Even after Tokyo became the capital in 1869, the ceremony of enthroning the emperors was held in the old palace at Kyoto. The city lies on the fertile Kinki plain of south central Honshu between Lake Biwa and the Inland Sea. It is a center of arts and crafts, and its ancient palaces and temples attract a host of tourists.

Until late in the 8th century the Japanese moved their capital to a new place at the beginning of each reign. Then in 794 the emperor Kwammu established his court here. The city that grew up around the emperor's court came to be called Heian-kyo, or "capital of peace." As the centuries passed and succeeding emperors remained there, it became known as Kyoto, or "capital city."

The Japanese rulers lavished their skill and riches to make Kyoto a regal city. At that time they were already learning their arts from China. Using a Chinese model they built Kyoto spaciouly. Throughout the city, parks and temple grounds were planted with azaleas, violet wisteria, and cherry orchards. Scores of courtly villas and palaces arose from gardens threaded by brooks and miniature lakes. For the imperial palace, a stream was led seven miles from Lake Biwa to run beneath a ceremonial hall. The cool murmur of the stream gave the hall its name, Serene and Cool Chamber. Until the 20th century the palace garden held no trees, for "the fall of the leaves was a too constant reminder of the transitoriness of things."

Birthplace of Japanese Culture

Encouraged by the imperial court, Japanese culture centered in Kyoto. Beginning about the 9th century, Buddhism spread throughout Japan, and Kyoto became its headquarters. Buddhists built more than 800 temples here. Shintoism too flourished in Kyoto, and its followers built some 200 shrines. Each year thousands of Japanese pilgrims came to the "city of temples" to worship. Many temples were destroyed time and again by fire, but nearly all were rebuilt. When one, founded in 1602, was rebuilt for the fifth time in 1895, its pillars were raised into place with ropes made from the hair given by women.

To Kyoto came Chinese to instruct the Japanese in making silk, porcelain, lacquer, and wood carvings. Workshops sprang up in the little bamboo-and-mud homes of Japanese artisans, and Kyoto products were carried to all parts of the nation. By 1699 the city had more than 500,000 residents. Later other Japanese cities grew larger and developed heavy industries, but Kyoto remained the artistic center of the nation. It retained world fame for its pottery, bronze, ivory wares, cloisonné, silk, embroidery, brocade, fans, and lacquer dusted with gold or silver powder.

This city of temples and ancient crafts also became the chief center of Christian education in Japan. In 1875 Joseph Niizima and Yamamoto Kakuma, in cooperation with the American Board of Foreign Missions, founded Doshisha University. By the time of World War II, more than 4,700 young men and women were enrolled at Doshisha. Kyoto Imperial University, including a school of agriculture, was founded in 1897.

Wealth of Hydroelectric Power

Two canals from Lake Biwa were built to supply hydroelectric power for Kyoto, which developed a network of electric street and interurban railways. Electric cable cars carried crowds of tourists to the summits of the nearby hills, some of them as high as 3,000 feet.

During World War II, virtually all the home workshops turned out munitions. Because the output was small and because the "factories" were homes, the Allies spared the ancient capital. It was the only major Japanese city that escaped bombing raids. Population (1950 census), 1,101,854.

L

The MEN and WOMEN Who WORK for WAGES



During a change of shifts at a large industrial plant the busiest machine is the time clock where workers "punch" in and out.

LABOR. Most of the men and women who make a living in the United States work for wages and salaries. They "hire out" their services and thus provide the general term *labor* in an economy called *laboristic*.

A laboristic economy is a relatively recent development in the United States. As late as 1870, more than half of all workers were engaged in agriculture. Now less than one worker in seven is so engaged. A rapid expansion of industry and trade has led to more and more persons becoming dependent upon wages and salaries earned in nonfarm work. (*See also* United States, section "How the People Meet Their Needs.")

The United States became a great industrial nation largely after 1900 (*see* Industry, American). Since that time sweeping changes have taken place in the ways people live and work together. Many ideas and institutions are still undergoing change. *Labor unions*, formed by wage earners for mutual aid and protection, are an example. The functions and responsibilities of these unions have not been fully defined or accepted. This has given rise to a long series of controversies with many of the old problems still in existence. Solutions to these problems are more urgently needed than ever before because so many Americans are directly concerned.

The Labor Force and Bargaining Power

Wages and salaries account for about two thirds of the national income. Some employees who receive salaries are not included in the group called "labor."



The great industrial production in the United States has made it possible for most workers to drive their own automobiles.

SETTLING A DISPUTE BY ARBITRATION

Persons who are hired for a year or more at a time and who exercise wide judgment or determined policy in their jobs are usually considered to be in the managerial or the professional classes. Business executives and college professors are examples.

The labor group consists of those who are paid salaries on a weekly or monthly basis or wages on an hourly basis. In general these people carry out the plans laid by others, working at routine tasks or following the instructions of supervisors. Thus labor is made up of the routine workers who, in the United States, form a highly essential part of the greatest economic and industrial machine ever created. Bricklayers, bookkeepers, coal miners, coat makers, farm laborers, longshoremen, locomotive engineers, laundry workers, machinists, television assemblers, and waiters—these are only a very few of the people who are "labor." (See also *Vocations*.)

The service performed by any one worker is not vital to the employer, and he can be eliminated. When the services of all the workers in a craft, trade, or industry are combined, however, they cannot be eliminated. In such a combination the relative bargaining power of labor, *collective bargaining*, is greater. Terms of employment can be fixed for all workers at one time rather than for each worker individually. This is important in business recessions or depressions when wages and working standards may be deflated in a disorderly manner under individual bargaining. Some observers maintain that collective bargaining is "monopolistic." During times of business prosperity, the "control" of all labor in a trade or industry may result in inflationary increases in wages and working standards. This issue—individual bargaining versus collective bargaining—has been fought heatedly in the United States.

Basis of the Labor Problem

Despite opposition, workers in every wage-earning class have formed unions to bargain collectively and to advance their interests by united action. Employers often resisted the formation of these unions. In the United States especially, employers emphasized their interest in preserving the right of the individual worker to stand on his own feet. Many of the most bitterly contested strikes in the nation were fought over employee demands for union recognition and collective bargaining.

Governments also sought to repress unions when they were first being organized. Because unions often won increases in wages which resulted in higher prices, they were widely regarded as being against the "public interest." As unions grew in power and prestige, governments have gradually come to recognize and even to encourage them. Today the workers' right to collective bargaining in the United States has been



An impartial chairman presides over an arbitration session between labor and management. Both parties have agreed in advance to accept his decision.

recognized as a matter of law, first under the Wagner act (National Labor Relations Act) of 1935 and then under the Taft-Hartley act (Labor-Management Relations Act) of 1947. Strikes are no longer conducted over union recognition but directly about wages and working conditions.

Even where wage earners have gained collective bargaining rights they are usually subject to being laid off with little or no prior notice. When the opportunity to earn wages disappears, often overnight, the average worker has no other way of providing for the necessities of life. Usually, he has been able to save up enough to carry him over only a short period of inactivity. This economic insecurity is not so keenly felt in times of prosperity when jobs are plentiful. During periods of declining business, however, when jobs are scarce, layoffs and the threat of layoffs can become the most critical factors in the lives of wage earners.

The widespread unemployment during the serious depression from 1929 to 1933—and the poverty and lowered morale which it generated—left a permanent mark upon an entire generation of wage earners. The careful specification and regulation of "seniority rights" in most factories are direct evidences of this mark. Seniority rights favor workers who have the longest terms of service. At times of production cut-backs, these rights often determine who gets laid off and who is kept on the job.

The government has had to recognize the critical importance of the unemployment problem in a laboristic economy. Since 1936 there has been a system of unemployment insurance, operated by the federal and the various state governments. This provides certain out-of-work benefits to wage earners who lose their jobs. The government has also tried to maintain full employment within the private enterprise system. This

AN UNSETTLED DISPUTE LEADS TO A STRIKE



In an effort to win their point workers may strike until the dispute is settled. These strikers are picketing their plant.

responsibility has been stated in the so-called Full-Employment Act of 1946. Unions have become increasingly interested in the possibilities of getting employers to agree to provide "guaranteed annual wages" to employees. This term is a very loose one, covering the payment of various kinds of benefits to laid-off employees. It is seldom an actual guarantee of an annual wage to all employees. The idea is to stimulate employers to regularize production so that there will be more steady employment.

The Need for Teamwork

The problems of collective bargaining and economic insecurity are only two aspects of labor relations. Equally important is the problem of how to get good teamwork in a laboristic economy. Everyone has experienced the difficulties of getting even a few people in a club or in a social organization to pool their efforts toward a common goal. Such difficulties are magnified many times in the factory or business enterprise. Here the individual efforts of many workers—up to the hundreds of thousands—have to be correlated and directed. The planning of output and the co-ordination of efforts to achieve production goals are the exacting tasks of management.

In management's use of "man power," much more is involved than merely hiring people. The productivity of labor depends in large measure upon the will of the individual to work and upon the teamwork which exists. People tend to resist arbitrary orders issued in a dictatorial manner; the orders have to "make sense" to them. Workers may work listlessly if they fail to appreciate the importance of their relatively small task to the over-all program.

Workmen are not cogs. They are human beings who must be led and not directed arbitrarily. The manner in which labor is used not only affects output but has much to do with the kind of person and

citizen the worker will be. In recognition of these considerations many companies have established personnel departments to deal with wage earners not simply as "labor" but as people.

Still another problem has a direct bearing on each worker's take-home pay. How is the money value of labor to be determined and how are wages to be allocated among the various specialized services needed to produce goods? For example, in the operation of a railroad train, how much should be paid to the locomotive engineer and how much to the locomotive fireman? Or, what should be paid to those who assemble radios and what to those who drive the trucks which deliver the radios to distributors? This is a problem requiring the closest kind of teamwork between labor and management. To solve problems of this kind, collective bargaining is being gradually developed. Such bargaining permits workers' representatives to participate as equals with the employer in determining the terms of employment.

The Question of Free or Slave Labor

Labor problems have arisen over the years in every society whenever individuals have joined to work together on a common objective. In a modern democracy, the common objective is an improved standard of living for all.

More of the necessities of life—and more of the luxuries—can be provided through joint undertakings than can be obtained if each person attempted to take care of all his own needs by his own individual efforts. American industry has shown that a bigger pie (gross national product) can be made when tasks are broken down for performance by specialists. (See *Industry, American*.) Controversies arise, however, about how to cut up the bigger pie for distribution among the many who contributed to its making. Another deep concern is the protection of the dignity and the rights of each individual who is on the production team. In a democracy, the freedom of the individual is vital. Men cannot be compelled to work under any certain terms or for any particular employer. Workers have the right to bargain about the terms and conditions of their employment. They can withhold their services if they believe the offer for such services is not enough.

The rights of the men and women who labor have varied greatly through the years. In ancient Greece and Rome, much of the labor was performed by slaves who were supplied with the necessities of life by their masters. In the Middle Ages, serfs were "bound to the soil" and were required to do certain work for the lord of the manor (see *Slavery and Serfdom*). Apprentices and journeymen under the guild system were paid largely in the form of food, clothing, and shelter provided by the master (see *Guilds*). Even today, under totalitarian regimes, workmen do not have the right to choose their employment or to bargain over their share of the value added to the product by their labor. Their services and their returns are determined by a "master plan" designed to use the individual for the state.

Americans would doubtless choose to follow a system of free labor in preference to a system of forced labor even if more goods and services would be secured by a dictatorial use of labor. It is a part of democratic faith that workmen who voluntarily accept employment are not only more free but also more productive than slaves or serfs. In other words, free labor outproduces slave labor. The miracles of production achieved in the United States prove the truth of this belief.

Individual or Collective Bargaining?

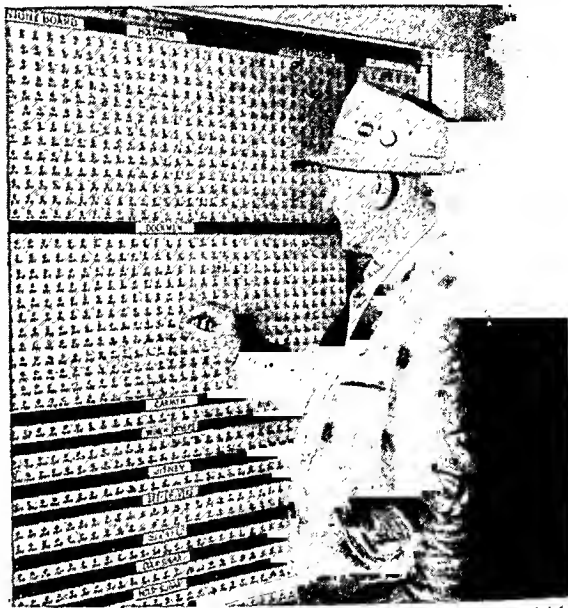
There has been a considerable difference of opinion about how the freedom of the individual can be reconciled with the necessities of collective bargaining. Proponents of individual bargaining believe that wages should be paid according to the worth of each particular man's services. They say that some workers are underpaid and some are overpaid when all the workers in a group receive the same wage or the same wage increase through collective bargaining. On the other hand, it is often impossible to measure differences in ability or performance among workers on routine and machine-tending operations. Attempts of foremen and supervisors to make such measurements frequently give rise to charges of favoritism and discrimination.

In individual bargaining the worker may find that he has to accept far less than he believes his services are worth. Because he is under pressure to provide week by week for the needs of his family, the individual worker usually needs his job more urgently than the employer needs his services. When jobs are scarce, individual workers with the greatest family need are under a strong compulsion "to get a job at any wage." Workers then "undercut" each other and break established standards. Some observers believe that such "flexibility" of wages is an essential step in reducing costs and in getting business to move upward again.

Others believe that undercutting of wage standards to obtain scarce jobs demoralizes the workers. They argue that this makes worse the already poor business situation by creating a chaotic downward spiral. At any event, since 1935 the national policy of the United States has been for the government to support collective bargaining when that method of fixing wages is desired by a majority of the employees. There is considerable concern, however, that the unions may get too strong and that the union leaders may dictate the terms of employment to both employers and employees. An important expression of this concern was the Taft-Hartley act, which regulated the conduct of unions in many particulars.

When collective bargaining prevails, no individual employee can bargain with the employer about his wages. Union representatives and the management negotiate wages for all workers—for the majority who belong to the union and also for any workers who do not. Under collective bargaining then, the individual workman participates in establishing the terms of his employment only through the union and

REGISTERING FOR A JOB ASSIGNMENT



When employment is seasonal or irregular, workers find jobs through a placement agency, or "hiring hall." This San Francisco longshoreman "plugs in" a board for a job as dockman.

not directly. Collective bargaining is a form of representative government in industry.

The Issue of Union Security

What if an individual workman does not want to join the union? Trade unionists believe that this is a rejection of the very idea of collective bargaining since such an individual wants to deal separately with the employer. They say "union security" or collective bargaining security is involved. To protect this principle they insist that once a majority of the workers choose collective bargaining all workers should be required to join the union. Here is an unresolved problem of great importance. What is the responsibility of the individual wage earner to wage earners as a group? To what extent is it necessary or desirable to introduce majority rule and to subordinate individual rights to the will of the majority? How can the rights of the individual and of the minority be protected without depriving the majority of its rights?

There are two principal plans to provide union security. Under a *closed shop*, the employer can hire none but union members. In a general way the union determines who may be hired. Under a *union shop*, the employer may hire anyone he wants, but each newly hired employee must join the union within a specified period or lose his job. In a general way the company determines who will be the union members. (In an *open shop* the employer may hire anyone, and new employees need not join a union.)

The union security issue continues to be one of the most controversial in the field of labor relations, because an individual workman may be forced to join a union as a condition of employment. The closed shop has been outlawed by the Taft-Hartley law. Under the same legislation, the union shop is

MAJORITY RULE IN A LABOR UNION



In organized labor, many decisions are made by taking a vote of the union members. The vote may be cast in person (above) or by secret ballot.

permissible, but an employee may be discharged if he fails to pay the regular union dues. The idea seems to be that since every employee receives the benefits of collective bargaining every employee should contribute to the financial support of collective bargaining.

Early Labor Movements Abroad

Labor movements began the same way in each country. The factory system of production led to workers being hired to work for a wage (see *Factories and Factory Laws*). Dissatisfied with their wages and conditions of employment, the wage earners developed a "class consciousness." They then combined their efforts to secure improved status and working conditions. They sought these goals by presenting a united front in bargaining with the employer and in pressing for favorable legislation.

The labor movement began in England in the 1700's when the Industrial Revolution brought sweeping changes in the way men earned a living (see *Industrial Revolution*). Power machinery had been invented. Large numbers of people were employed to operate this machinery in factories. Others were hired to produce the materials needed by the factories. Still other employees were needed to transport great quantities of products to consumers. The wage earners did not share very much in the greater output because of their intense competition for jobs. Often paid barely enough to sustain life, everyone in the family had to work in order to eat. Workers, including women and children, often labored from 12 to 14 hours a day (see *Child Labor Laws; Sweatshop System*).

Individual workers could do little to improve their lot. Anyone who protested too vigorously—or who failed to show the "proper respect" to the employer—placed his job in danger. A discharged employee might

even be unable to get another job if he were *blacklisted* by the employer as a troublemaker.

To seek higher wages and improved conditions, workers in a trade or in a factory combined to form one organization, called a trade union or a labor union, and one spokesman to represent them. If the employer refused the united demand of the workers, all the workers could stop work—that is, they could *strike* until their demands were granted. There were usually a few workers who did not want to join the union. The other workers looked upon them as enemies to their own class; the employers looked upon them as "loyal employees."

During a strike, the plant would be *picketed*—strikers would march up and down before the factory and seek to induce reluctant or timid employees not to

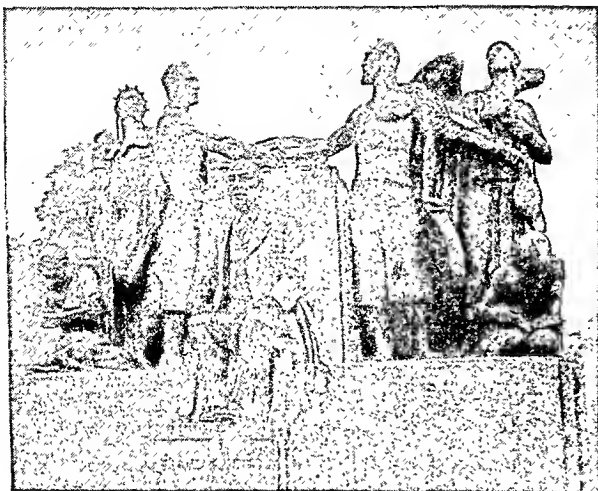
work. Those who "went through the picket line" to work were called *scabs*. Employers would sometimes hire professional *strikebreakers* to man the struck jobs, and then violence would often develop on the picket lines. The employer could easily discharge one man; he could not discharge all the employees if he wanted to stay in business. Strikers insisted that they retained the right to their jobs; they reasoned that they had temporarily withdrawn their services while negotiations were going on. By united action, employees could press their demands much more effectively and with less chance of losing their jobs. However, the ultimate need for income often resulted in the employees giving in to the employer and abandoning their strike.

Emphasis on Legislative and Political Action

When the Industrial Revolution spread to other countries, the labor movement did also. All attempts of the workers to form unions were fought by the employers and severely repressed as conspiracies by the governments. Despite such opposition, the workers persisted until their right to organize unions was recognized. Such recognition came gradually. The British government first passed legislation approving the right of workers to form unions in 1825 and under the Trade Union Acts of 1871 and 1876 gave unions full legal recognition, including the right to strike. At the same time, Great Britain began adopting legislation to reduce industrial hazards and to promote social insurance. In advance of most countries, Great Britain made legislative provision for workers' old age, unemployment, and sickness.

From their very start, the labor movements in England and on the Continent were largely associated with political movements. The workers in Europe exerted great efforts to elect their own representa-

HONORING AN AMERICAN LABOR LEADER



The first great champion of American labor was Samuel Gompers, honored in this memorial in Washington, D.C. It was erected by the American Federation of Labor; the designer, Robert Aitken.

tives to the government in order to press for legislation covering minimum wages, old-age pensions, and the like. They believed that an improvement in the lot of the workers could be more readily gained from the government than from the employer. Germany pioneered in the field of accident, sickness, and old-age insurance under Bismarck's rule in the 1880's. The Scandinavian countries later assumed leadership in extending social insurance.

Despite the legislative support for their needs, European workers did not believe they could substantially improve their lot in a capitalistic system in which the "tools of production" were owned by the employers. In this, they were strongly influenced by the views of Karl Marx (*see* Marx). These workers believed their well-being ultimately depended upon their ownership of the tools of production through the government. Seeking to supplant capitalism with socialism, the European labor movements supported far-reaching political as well as economic reforms. (*See also* Labor Parties.)

In marked contrast to the "class conscious" attitude of European labor, wage earners in the United States organized primarily to improve their bargaining position with their employers. They were long suspicious of government "intervention" in industrial relations. American workmen accepted as desirable the private ownership of the tools of production. At the same time, they insisted that they must have strong unions to get the "equality of bargaining power" which comes from group control of jobs by the workers. Once such a bargaining status was attained, the wage earners believed they could take care of their own interests in collective bargaining. This point of view has been called a "limited objective."

Beginnings of American Labor Movement

In the United States management and labor have demonstrated an ability to settle their differences and to co-operate for the common objective of economic progress. American labor history has been

stormy, however. Even the "limited objective" attitude has been vigorously opposed by many employers and often by the government.

The factory system was relatively late in starting in the United States. As late as about 1890, workers did not have to labor in a factory if conditions became too oppressive. They could "go West" and take up farming on free land. As a result, the bargaining position of American workers was never as poor as that of European workers.

American wage earners rejected individual bargaining very early. They strove, usually against strong obstacles, to form unions. The cordwainers (shoemakers) of Philadelphia started a union in 1792 and conducted a strike in 1799. Early unions in the United States were *craft unions*—formed by skilled craftsmen of particular trades in a certain city.

The first efforts of craftsmen to form such unions resulted in the so-called Conspiracy Cases decided from 1806 to 1815. In these cases, the cordwainers who struck against their employers were found guilty of conspiracy. This doctrine was rejected in 1842, however, in the famous Massachusetts decision of *Commonwealth vs. Hunt*. It was ruled that unions, even if formed to strike in order to maintain a closed shop, were not illegal. It was held, however, that the methods employed by unions could be illegal.

For many years unions remained weak. On the upswing of the business cycle, when wages lagged behind increases in the cost of living, workers joined unions. This helped to secure wage increases from the employer who could not afford a complete stoppage of work. When the business cycle turned downward, however, unions lacked the power to halt wage decreases. Workers then dropped out of unions because they thought the unions could not do anything for them. For many years, union membership ebbed and flowed, generally following the business cycle.

The first relatively permanent national labor organization in the United States was the Knights of Labor. Organized in 1869 by Uriah Smith Stephens, the K. of L. admitted all workers without regard to skill or craft and included farmers and small shopkeepers. For some time the K. of L. was a secret order with special handclaps and rituals. Secrecy was abandoned about 1880; thereafter the membership grew to about 700,000 in less than a decade.

The program of the K. of L. was varied and included an emphasis upon producers and consumers co-operatives. Although the leaders of the organization strongly favored arbitration, many strikes were conducted. Some were quite successful. The strong opposition of employers and internal dissension within the labor organization, however, seriously weakened the Knights and they formally disbanded in 1917.

The History of the A. F. of L.

While the Knights of Labor was still a power, the groundwork for the American Federation of Labor was laid. In 1881, six craft unions met in Pittsburgh and founded the Federation of Organized Trades and Labor Unions. Five years later, at Columbus, Ohio,

this group was absorbed by the newly created American Federation of Labor, which was soon recognized as the leading spokesman for organized labor in the United States. The leaders of the A.F. of L. have been Samuel Gompers, William Green, and George Meany, who became president in 1952 (*see* Gompers).

A principal function of the A.F. of L. has been to charter national unions, thus giving such unions an exclusive jurisdiction over certain jobs—that is, the right to organize those who work on the specified jobs. Some of these chartered unions are “international,” which means they have local unions in Canada or Mexico. The jurisdiction of a national union may be designated on a craft basis, covering various industries, called *horizontal jurisdiction*; or, it may be designated on an industrial basis, covering various crafts, called *vertical jurisdiction*.

The A.F. of L. developed the principle of horizontal organization. Workers in each of several crafts in a factory or in an industry joined with the same craftsmen employed elsewhere to form a union. Thus, electricians are in the same A.F. of L. union regardless of the plant or industry at which they are employed. The craft unions have frequent “boundary disputes” over the jurisdictions allocated to them, and the A.F. of L. is responsible for settling such disputes. Strikes over union jurisdictional disputes have come to be recognized as an inappropriate use of economic power, because the employer may be hurt, although he is not usually a party to the dispute.

The national or international unions chartered by the A.F. of L. are autonomous. Their operations and policies are not subject to regulation by the A.F. of L. If the actions or policies of a national union are considered improper, however, the A.F. of L. may withdraw the charter and assign jurisdiction to another union. In such cases, the Executive Council of the A.F. of L., the co-ordinating body, makes recommendations to the Convention, which is the final authority of the A.F. of L. Such an action was taken in 1953, when the International Longshoremen's Union was expelled because of an alleged tie-in between the heads of that union and certain racketeers. A new union was then chartered by the A.F. of L. to exercise jurisdiction in behalf of longshoremen.

Except for such disciplinary action, each affiliated national union of the A.F. of L. is free to make its own rules and to develop its own policies. Local unions are chartered by the national unions. It is the local union—close to the workers—which is largely responsible for actually bargaining with the employer and representing the employees in day-by-day affairs. The local union may always seek the assistance of the national office.

Various local unions, affiliated with different A.F. of L. national unions but operating in the same area, form Central Labor Unions in their cities. They also form State Federations under direct charter from the A.F. of L. and not from their national unions. The city and state federations represent the workers in various kinds of local problems. In the same manner,

the A.F. of L. speaks for its membership with respect to various national problems.

The A.F. of L. and its affiliated unions have exerted their main efforts toward establishing and developing collective bargaining. These unions have traditionally not agitated for large-scale economic reforms and, with few exceptions, have not supported particular political parties. The political attitude of the A.F. of L. was stated by its first president, Samuel Gompers, who advised: “Reward your friends and punish your enemies.” Convinced that the workers' well-being could best be protected by the strength of their own organizations, Gompers was distrustful of government intervention.

Although the A.F. of L. consists principally of horizontal craft unions, some of its affiliates have long been industrial unions. The International Ladies' Garment Workers' Union is an example of a national union with jurisdiction over all workers, regardless of craft, who work in and about women's clothing factories. In most cases, however, the craft setup predominates and for very good reasons. It is not easy to replace craftsmen when they strike. They therefore have had a greater economic bargaining power than the semiskilled and unskilled employees who could more readily be replaced.

During and after World War I, however, the number of unskilled and semiskilled workers increased greatly in the rapid expansion of such mass-production industries as steel and automobiles. In seeking to unionize these factory employees, the craft unions engaged in heated disputes. The factory jobs in question did not fall easily into the craft classifications. Moreover, many of the workers in these industries strongly opposed being represented by several unions. They believed one union should represent all the workers employed by the company, even though they performed many different kinds of work. Some of the craft unions, it was alleged, cared little about taking semiskilled workers into their organizations.

The Revolt of the C.I.O.

In 1935 arguments over organizing workers in the mass-production industries split the A.F. of L. John L. Lewis and seven other union leaders then formed the Committee for Industrial Organization. They claimed that the A.F. of L. organization program was inadequate and began organizing on a vertical basis workers employed by such industries as automobile, steel, rubber, and textiles. The participants in the rebel Committee were expelled from the A.F. of L. in 1936. Two years later they held a constitutional convention and formed the Congress of Industrial Organizations under the leadership of John L. Lewis (*see* Lewis, John L.). Philip Murray of the Steelworkers was elected to the presidency of the C.I.O. when Lewis resigned in 1940. Following the death of Murray, Walter Reuther of the Automobile Workers was elected president in 1952.

The C.I.O. is a national union organization which charters affiliates and gives them jurisdictional rights to organize workers in specified industries.

Like the A.F. of L. affiliates, the C.I.O. national unions charter local unions which are united into city and state federations or councils. In consequence, unions chartered by the A.F. of L. and unions chartered by the C.I.O. have each claimed the right to organize particular groups of workers for collective bargaining. This is termed "dual unionism."

Many efforts have been made to create a "united labor movement" by bringing together the A.F. of L. and the C.I.O. Although these efforts have not succeeded, they have brought about a closer understanding and co-operation on some matters. Even if the A.F. of L. and the C.I.O. should merge, union labor would not be entirely united. There are national unions independent of both the A.F. of L. and the C.I.O. The United Mine Workers of America is an example. Affiliated at different times with both the A.F. of L. and the C.I.O., it is now independent. Another such "independent" is the United Electrical Workers Union, one of 11 unions expelled from the C.I.O. in 1949-50 for allegedly being under Communist domination.

Some national unions have always been independent. One of the most powerful of these independent labor groups is the Railway Brotherhoods of engineers, conductors, firemen, and trainmen—the so-called "big four." There are also many "independent unions" or "company unions" composed of employees of a particular company and not affiliated with any national union or with other workers employed by other companies in the same industry.

The Wagner Act Aids Labor

The rise of the C.I.O. was rapid. It quickly organized workers in many previously unorganized plants and industries. It established collective bargaining relationships where only individual bargaining had existed. Affiliates of the C.I.O. secured labor agreements with such great companies as the Goodyear Tire and Rubber Company, the United States Steel Corporation, and the General Motors Corporation.

The most bitterly contested C.I.O. strike was launched in 1937 against the Republic Steel Company. Like many other C.I.O. strikes it was primarily an *organizational* one. This type of strike was undertaken not simply to secure higher wages but rather to win management's recognition of the union and management's assent to collective bargaining.

Then labor obtained a new way to win union recognition. It was provided by the Wagner act, passed in 1935. The Wagner act was deliberately one-sided in favor of labor. Its principal purposes were (1) to outlaw certain actions of employers which interfered with the formation of unions, and (2) to guarantee collective bargaining to employees whenever a majority of the employees wanted it. These rights were to be protected by a newly created National Labor Relations Board (NLRB). Workers did not have to win a strike to get collective bargaining; they could get collective bargaining by winning an industry election. After 1937, the representation election supplanted the organizational strike.

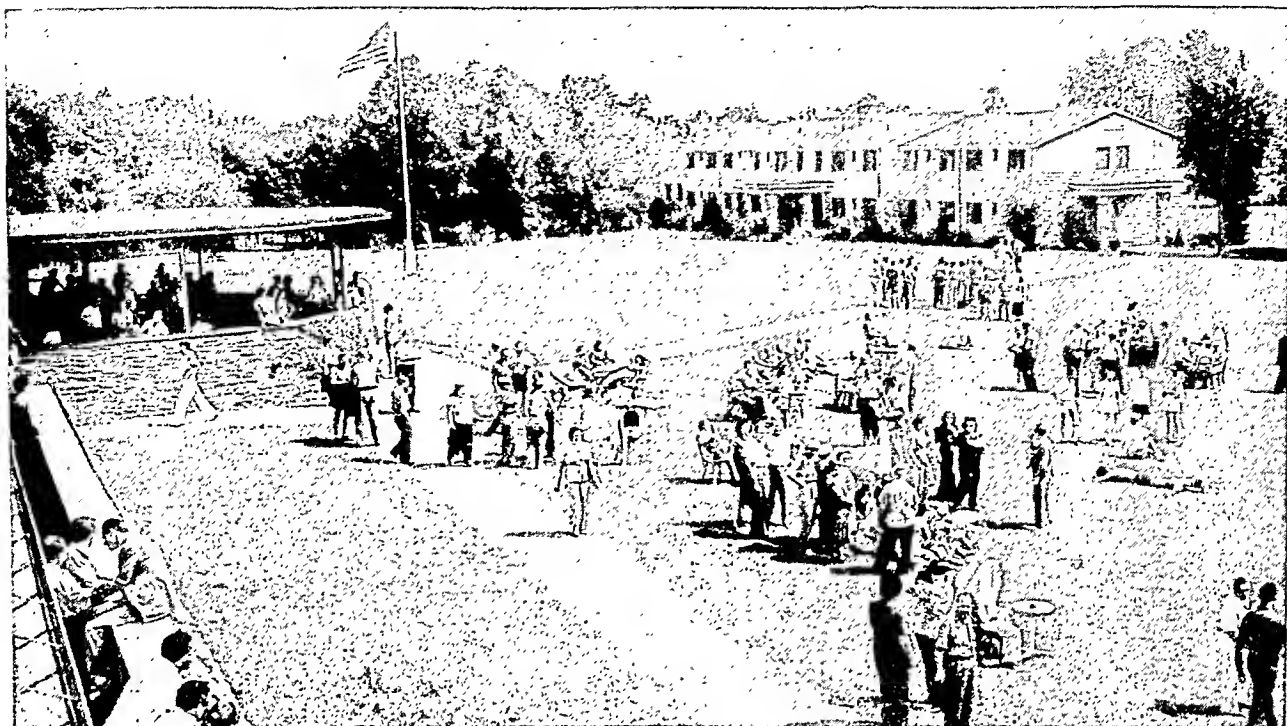
Protected and assisted by the Wagner act and encouraged by the industrial expansion during World War II, unions increased their membership rapidly from 1937 until about 1947. Then a leveling-off period began. Today the total labor movement consists of well over 16 million members, including about 2½ million women workers. Some 2 million workers belong to various independent unions. More than 100 unions are affiliated with the A.F. of L., and their combined membership is estimated at about 10 million. With more than a million members, the largest single A.F. of L. union is the International Brotherhood of Teamsters, Chauffeurs, Warehousemen & Helpers of America (the Teamsters). The C.I.O. membership is estimated at between 4 and 5 million. The principal C.I.O. unions are the United Automobile, Aircraft & Agricultural Implement Workers of America (the Automobile Workers) and the United Steelworkers of America (the Steelworkers). Each of these unions has about a million members.

The Controversial Taft-Hartley Act

During World War II, with but few exceptions, labor co-operated with the War Labor Board to resolve disputes without interrupting production. By 1946, many unions had become so powerful that certain of their practices were subjected to critical attack. There developed a demand for some restricting of the right to strike. For example, industry-wide strikes in coal or steel brought great inconvenience to the public. Such union power was called "monopolistic." Strikes broke out in many industries in 1946 and 1947. Wages, which had been controlled during World War II, moved upward by great leaps in the so-called wage-pattern increases. It was claimed the unions helped inflation by their wage policies. It was also charged that under union-shop and closed-shop practices individual employees were being bullied by union leaders. The unions were not successful in counteracting these charges. Out of these circumstances came the Taft-Hartley act.

The Taft-Hartley act was passed by Congress in 1947 over the veto of President Truman. Many parts of the Wagner act were retained but a large number of new rules and regulations were introduced. The closed shop was outlawed and only a limited kind of union shop was allowed. Boycotts were made illegal. Some unions, such as those of the Teamsters and the Building Trades, had long used the *boycott* weapon. One local union of the Teamsters, for example, would not make delivery of apples to a store if such apples were purchased from a company which was in dispute with another local of the Teamsters. Such pressure on the third party was deemed to be improper. So-called *wildcat strikes* also became the subject of legislation. Such strikes occur when employees stop work in violation of the terms of a labor contract. Under the Taft-Hartley act, the union was made subject to suits for damages for such occurrences. Special procedures were provided by the act for dealing with public emergency disputes; specifically, an injunction could be secured by direction of the president

A VACATION RESORT FOR UNION MEMBERS



One of the pioneers in providing benefits for workers has been the International Ladies' Garment Workers' Union. In addition

to operating medical centers, schools, and gymnasiums, the I.L.G.W.U. owns this thousand-acre resort at Forest Park, Pa.

of the United States, forbidding the union to strike for a certain period. In addition, the NLRB was increased to five members, with administrative functions given to a general counsel.

The Taft-Hartley act has come to have symbolic importance. Most labor union officials condemn the act as grossly unfair to workers. Long arguing for outright repeal, most union officials now seek amendments which would make the act less "antilabor." Some public opinion polls, however, seem to show that individual union members are in favor of many parts of the act. A number of management organizations, such as the National Association of Manufacturers and the United States Chamber of Commerce, have championed the act. They have suggested "strengthening" it in the form of additional regulation of unions and of union power.

The Taft-Hartley act has become a controversial political issue. In 1954, the secretary of labor, James P. Mitchell, said that the continuous argument for changes in the Taft-Hartley law had become "a battle of the professionals." In other words, the arguments had become so technical and involved as to have little significance for the people who work for a living or for the management group which tries to develop good teamwork at the plants.

Constructive Labor Problems

Labor unions and industrial relations attract the most attention when bargaining fails and a strike is called. Far more often than not, however, union and management reach an agreement around the conference table. Despite the undue attention given to strikes, there is strong evidence that union and man-

agement are developing an understanding of each other's functions and a respect for each other. There is a growing conviction that collective bargaining will work as a democratic institution and will contribute to economic progress.

Perhaps the greatest progress has been made in dealing with the many little day-by-day problems involved in the operation of the plant or business enterprise. Management must make thousands of administrative decisions which affect the workers. One man receives a disciplinary layoff for insubordination; another man is passed over for a promotion; a piece rate is fixed for a new operation. When workers feel that their rights are infringed by such decisions, they file what are termed *grievances*. Nowadays, provision is made in most labor agreements for a careful step-by-step appraisal of these grievances by various union and company representatives.

If no agreement is reached, it is customary to submit grievances to an outside arbitrator. He will decide the issue with both parties having agreed in advance to accept his ruling. About 90 per cent of all labor agreements in the United States make provision for *arbitration* as the final step of the grievance procedure (see Arbitration). Through such procedures a system of industrial jurisprudence is gradually being developed in many companies and in many industries.

Voluntary arbitration is now used extensively in the United States to settle grievance disputes arising *under the terms* of a labor contract. For example, was Employee A or Employee B entitled to promotion under the seniority clause of a labor agreement?

Arbitration is not generally acceptable to either unions or employers, however, to settle a dispute *over the terms* of the contract itself. For example, should there be a general wage increase of \$0.15 an hour? Both parties say the stakes are too great in such a case to entrust an outsider to make a decision. They prefer a strike, if necessary, over such an issue. This places pressure upon both parties to modify their extreme positions to reach agreement. Only after an agreement is made will the workers return to work and management obtain production.

Why should not the parties agree before a strike instead of after a strike? To help them do so, the federal government and several state governments provide *conciliation and mediation services*. Such services have been available to the railroad industry since 1926. Under the railroad legislation, grievance disputes can be submitted to Adjustment Boards. Disputes over contract terms are dealt with by the National Mediation Board, which reports directly to the president of the United States. If a dispute threatens to interrupt railroad transportation, the president may appoint an Emergency Board to make recommendations for a settlement. No strike is permissible while the Board investigates or for 30 days after a recommendation is made. Disputes in other industries are now under jurisdiction of the Federal Mediation and Conciliation Service. This was established by the Taft-Hartley act as an independent agency. (See also United States Government, section "Department of Labor.")

Labor Unions Today

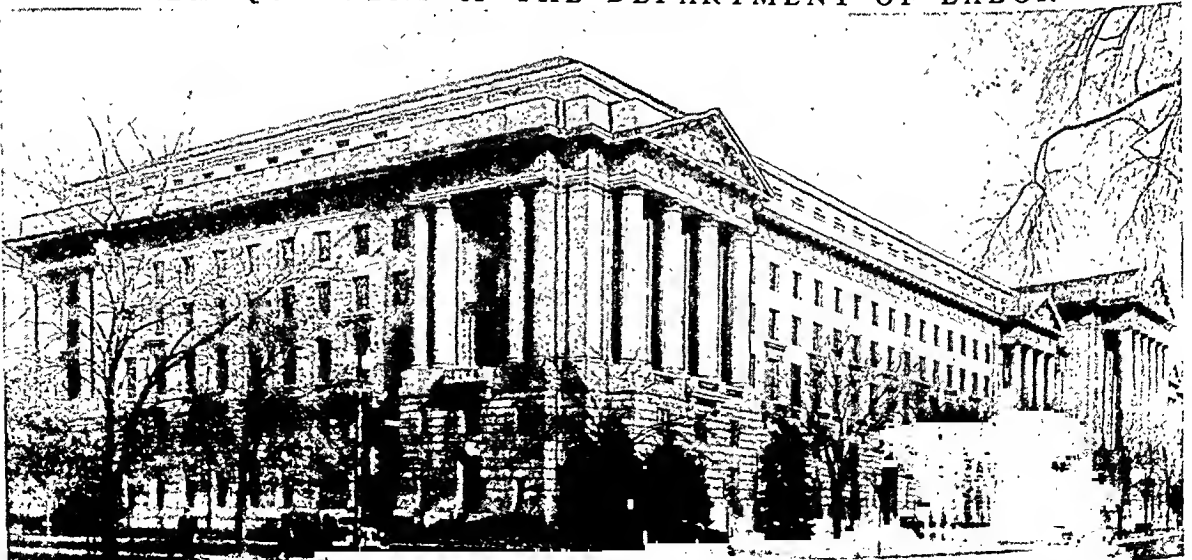
Some unions have done much more for their members than to act as collective bargaining representatives. Active membership in such organizations as the Amalgamated Clothing Workers or the International Ladies' Garment Workers' Union can be a way of life.

Both of these unions have medical centers, schools, and gymnasiums. With the employers, broad pension and vacation programs have been worked out. The "Amalgamated" has a bank which provides capital to bolster weak companies and to make jobs more secure. The I.L.G.W.U. has a leadership development course to train employee representatives. Almost every union in the country has taken some steps to help the general well-being of its members.

Organized labor has also helped to bring about many humanitarian reforms through legislation. Laws have been passed to regulate the conditions of employment of women and children and to specify maximum hours of employment and minimum wages for all workers. Legislation was also passed to protect against industrial accident, unemployment, and old-age dependency. Prior to the 1930's it was believed that jurisdiction over labor legislation was denied to the federal government by the Constitution. Such jurisdiction thus remained subject to control of the state legislatures. This was changed by the Supreme Court ruling on the constitutionality of the Wagner act in 1937. The court held that Congress had a right to regulate industrial relations on the ground that such relations affected the flow of interstate commerce.

Before 1937, the drive of organized labor for legislative reforms had to be conducted state by state. Massachusetts was a leader in labor legislation. In blazing new trails, however, its industry was often placed at a competitive disadvantage with the industry of other states which lagged. Over many years, the A.F. of L. and other unions have worked in each state to secure the passage of Workmen's Compensation Acts providing for payments in the case of industrial accidents. Even today such protection is not uniform; wide variations exist in the benefits available in the various states (see *Employers' Liability*).

HEADQUARTERS OF THE DEPARTMENT OF LABOR



One of the major executive departments of the federal government is the Department of Labor, which has occupied this im-

posing building since 1935. It is located at Constitution Avenue (foreground) and 14th Street in Washington, D.C.

One of the first federal aids to workers was the Social Security Act, passed in 1935. This provided a combination of federal and state assistance to the aged and the unemployed. (*See also Social Security.*) The Fair Labor Standards Act, first passed in 1938, required concerns engaged in interstate commerce to pay overtime for work in excess of 40 hours a week. It also set a minimum wage which is now \$0.75 per hour. These acts have received widespread support. At the same time, there is some tendency to question the degree of control over labor matters now exercised by the federal government. Proposed amendments to the Taft-Hartley act periodically include proposals to "give back to the states" the power to legislate over strikes and picketing.

In 1950 a significant agreement in the steel industry set a pattern for old-age pensions. It was also in 1950 that the Automobile Workers and the General Motors Corporation signed a five-year agreement periodically adjusting wages to changes in the cost-of-living index. This was the so-called *escalator clause*. (*See also Living Costs.*)

Foreign and International Labor Groups

One of the largest labor groups abroad is Great Britain's Trades Union Congress, with a membership of about 8 million. The German Federation of Trade Unions has about 6 million members. In France, the General Confederation of Labor claims about 5 million members. Italy's Communist-dominated General Confederation of Labor has about 5 million members. Canada has more than one million labor unionists, about half of them belonging to the Trades and Labour Congress. Russian trade unions include almost all wage earners. Dominated by the state, the Soviet unions serve chiefly as a means of controlling the workers and increasing production.

The first international labor organization was the International Secretariat of National Trade Union Centers, formed in 1901. In 1949 the C.I.O., A.F. of L., U.M.W., and the unions of other free countries formed the International Confederation of Free Trade Unions (ICFTU). This organization was recognized by the United Nations in 1950.

The International Labor Organization was created along with the League of Nations in 1919. In 1946 it became affiliated with the United Nations. The ILO represents governments, employers, and workers. It seeks to eliminate child labor, secure safe working conditions, and aid the spread of free unions.

Labor Day and May Day

In the United States and Canada, the first Monday in September is celebrated as Labor Day in honor of all wage earners. This celebration grew out of an annual September parade in New York City by the Knights of Labor during the 1880's.

Oregon, in 1887, was the first state to recognize Labor Day as a legal holiday. Seven years later Congress made the day a national holiday. In many nations organized labor and radical political parties hold demonstrations and parades on May 1. (*See also Labor in the FACT-INDEX at the end of this volume.*)

LABOR PARTIES. After workingmen had organized unions to deal with employers they also founded political parties in some countries. Their purpose was to influence government and secure favorable legislation. (*See also Labor.*)

In England various socialist societies, notably the Fabians and the Social Democratic Federation, became active in the late 1800's. These societies, working with the Independent Labor party founded by James Keir Hardie in 1893, sought to send members to Parliament. In 1899 the Trades Union Congress began backing the movement. As a result the Labor party was created, and it won nearly 30 parliamentary seats in the 1906 election. After World War I the Labor party became the chief opposition group to the Conservatives (*see English History*). In Australia and New Zealand also, labor parties have held a prominent place in government since World War I.

On the continent of Europe, labor parties grew out of trade unions but generally they took the name of some political doctrine such as Socialism. During the 1930's Germany, Italy, and Spain suppressed these parties, but most of them sprang up again after World War II. The workers in Asiatic countries and in Central and South America also began asserting themselves. In some nations the party members disagreed on the political and economic changes they wanted. Usually the majority of the members favored Socialism, but a strong minority supported Communism (*see Communism; Socialism*).

The first Labor party in the world was launched in the United States. This was the Working Men's party, formed by trade unionists in Philadelphia in 1828. This party soon died. A Socialist Labor party was founded in 1874. In 1901 some members split off to form the Socialist party. This group in turn was weakened by the rise of the Communist party.

Labor unions gave little support to these parties and preferred to campaign for prolabor candidates of the regular political parties. No effective national labor party arose in the United States, but at times labor parties have gained control of a city or a state. The American Labor party did this in New York City and the Farmer-Labor party in Minnesota.

The rapid growth of union membership since the mid-1930's has given the large unions tremendous political power. Working within the framework of the Democratic and Republican parties they played the political role of rewarding friends and punishing enemies. During most of these years organized labor generally tended to support the Democratic party, either directly or indirectly. Labor unions have also campaigned for such social legislation as public housing, civil rights, and a social security program.

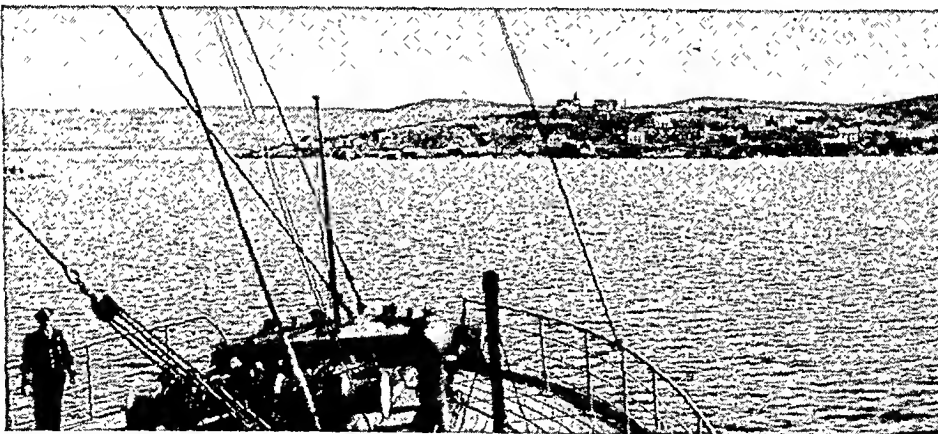
In 1943 the Congress of Industrial Organizations (C.I.O.) established a Political Action Committee (P.A.C.), which exerted considerable influence in subsequent elections. The American Federation of Labor (A.F. of L.) organized Labor's League for Political Education in 1947 to support prolabor objectives and candidates.

LABRADOR. The northeastern corner of the North American continent is the peninsula of Labrador. This peninsula extends from Hudson Bay to the Atlantic Ocean and from the Gulf of St. Lawrence to Hudson Strait. Its area is more than half a million square miles. This vast land is governed by the Canadian provinces of Quebec and Newfoundland.

The name Labrador is now generally understood to refer only to the eastern triangle along the Atlantic coast, which is part of Newfoundland. This section is also sometimes called Coast of Labrador. It covers 112,630 square miles. The Quebec section is known as Ungava or New Quebec. The boundary between the two areas runs along the "height of land" separating the watersheds. It was established in 1927 by the English Privy Council. (For map, see Canada.)

The peninsula is a part of the rocky Laurentian Plateau (see Laurentian Plateau). Over the southern part stretches a great spruce forest. The forests thin out toward the north, and the upper third of the peninsula is treeless tundra. Near Hudson Strait, is Chubb Crater, the world's largest meteor crater (see Meteors). At least a fourth of the peninsula is covered with marshes, lakes, and streams. The Atlantic coast line, about 1,200 miles long, is fringed with islands and deep arms of the sea (*fjords*). The south coast is low, but toward the north bold cliffs rise 2,500 to 5,500 feet out of the sea.

A FISHING VILLAGE ON THE LABRADOR COAST



The coast of Labrador, battered by cold seas from the Arctic, is a treeless, rocky waste. This settlement of fishermen has a church and school (on the top of the hill) supported by the International Grenfell Association. Trading vessels bring supplies to the coastal villages in the summer months.

The cold Labrador current flows down from the Arctic Ocean and makes the climate along the coast very severe. Inland it is somewhat milder, but winter temperatures reach -50°F . Summers are short and cool. A few hardy vegetables are raised in village gardens, but agriculture can never be highly developed.

A Promising Industrial Future

Except for the fishing villages on the coast, the peninsula was unbroken wilderness until 1941, when Goose Bay Airport was built at the head of Hamilton Inlet. On the great circle air route between North America and western Europe, it has become an important military and commercial air base.

One of the world's largest deposits of iron ore lies along the Ungava-Labrador border 350 miles north of the Gulf of St. Lawrence. At Allard Lake, 22 miles north of the gulf, is the world's largest deposit of ilmenite (titanium ore). Railroads are now under construction northward from the gulf to both areas (see Quebec). Many other minerals are known to be present and only await opening up of transportation.

Water power in the peninsula is enormous. Over the edge of the plateau the rivers descend in foaming rapids and mighty waterfalls. The Hamilton River (600 miles long) empties into Lake Melville, an arm of the Atlantic Ocean. About 230 miles from its mouth, it falls 1,038 feet in 16 miles. At Grand Falls it plunges 245 feet into Bowdoin Canyon. This river alone has been estimated to have as high as 9 million horsepower. Eventually water power will be used to operate pulp and paper mills, whose raw materials are the great spruce forests.

The People and How They Live

Labrador (the section in Newfoundland) has only 7,890 permanent residents (1951 census). Ungava, which is four times larger, has half as many people. The white people, of English and Scottish ancestry, are called "Livveres" ("live here"). Practically all of them live in tiny villages perched on the bleak rocks of the south coast. North West River, on Lake Melville, is the largest town. In the north are Eskimos. A few

wandering Indians of the Montagnais and Naskapi tribes live in the interior forests.

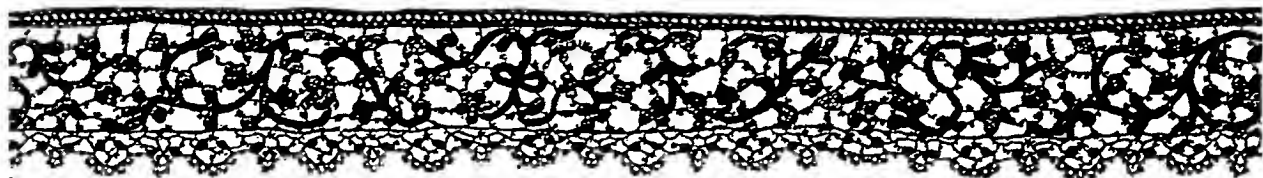
In summer several thousand fishermen come from Newfoundland and other parts of Canada to fish for cod. This is the chief industry. Some salmon and trout are also taken. Most of the catch is carried to Newfoundland for processing. Fur trapping is carried on in the winter months.

The fishermen and their families lived in

great poverty and distress until a young English doctor, Wilfred Grenfell, began his remarkable work to help them (see Grenfell). The International Grenfell Association maintains schools, churches, hospitals, and nursing stations along the south coast. In the north, the Moravian Missionary Society has six stations where most of the Eskimos live.

The Atlantic coast of Labrador was visited by the Norse as early as 986 and by Leif Ericson in the year 1000. John Cabot rediscovered it in 1498. It was made a dependency of Newfoundland in 1855. In 1949 Newfoundland and Labrador together became the tenth province of Canada (see Newfoundland).

DAINTY LACES *and* HOW THEY ARE MADE



The well-known "barb and scroll" pattern is shown in this strip of 17th century Venetian needlepoint lace, the scroll being embellished with "barbs," the leaf of the heraldic rose. Floral patterns were developed later than the typical scroll designs.

LACE. When Eugénie de Montijo married Napoleon III of France, she received as a wedding gift a lace flounce on which 36 women had worked 18 months. A filmy lace dress displayed at the Paris Exhibition of 1867 required seven years of toil by 40 women. Its owner valued the dress at \$17,000.

These are examples of the extreme costliness of lace, and the painstaking toil required in its making before the invention and perfection of lace-making machines, which have made possible the mammoth lace industry of today. On these machines many thousands of yards of lace can be made in less time than a half hundred workers can make a few inches of hand-made lace of the same pattern. Some of these machine-made laces are so exquisite in beauty of design and perfection of finish that it is difficult even for experts to distinguish them from hand-made laces.

The lace-making machine is one of the marvels of the commercial world. Imagine a machine carrying on its reels, which are set one above the other, fine threads set so close together that a silver quarter can just pass edgewise between them. The power is thrown on, and shining little flattened bobbins dance in and out between the close-set threads. Sometimes they dart swiftly over one thread and under the next; sometimes they stop and vibrate rapidly a fraction of a second before they go on. This vibrating movement twists sometimes the warp threads fastened to the reels and sometimes the bobbin threads, and the patterns are made by these twisted threads. Combs quickly press down through the threads to the completed pattern to make it more compact, and more quickly still are up and out of the way. Sixty pieces of lace are often made simultaneously.

The History of Lace-Making

As in the case of so many other labor-saving machines, the development of the lace machine to its present perfection was a slow process. Away back in 1760 a stocking weaver of Nottingham, examining the lace on his wife's cap, believed he could make a similar fabric on his stocking machine, and he did produce an open mesh fabric which, however, was a knitted fabric made of one thread passing from one end of the frame to the other, and which unravelled if the thread broke. This was improved by the invention of the bobbin net machine in 1809, so called because the threads were wound on bobbins. Later, flowered lace was produced by machines which used the pattern-weaving device perfected by J. M. Jacquard in 1804 (see Spinning and Weaving). Nearly every design and

mesh of hand-made lace has been mechanically produced. Europe's machine lace industry centers in Paris, Lyons, Calais, Saint Gall, Nottingham, and Plauen, and the United States makes a large quantity.

Hand-made laces are still made all over the world, but their production in quantities for commerce is confined to China, France, Belgium, Ireland, Italy, England, and the Philippines. The infinite care and the great amount of time that are required to produce hand-made lace will always make it one of the most expensive articles of commerce. Of course there are many different grades of hand-made laces, varying in value according to the fineness, the design, and the time needed to make the individual piece.

How Lace is Made by Hand

Hand-made lace is of two types—needlepoint and bobbin or pillow lace. Needlepoint is made with a needle and a single thread. The pattern drawn on parchment is stitched to a piece of heavy linen for the purpose of holding it straight. Threads, sometimes three or four in number, are laid on the many lines of the pattern, and are lightly fastened through to the linen. The entire figure is then worked, filling and open work, mesh by mesh, and when it is completed the stitches holding it to the linen are cut and the lace comes free.

In bobbin lace, the design is drawn off on stiff parchment which is carefully stretched over a "pillow," a round or oval board stuffed to form a cushion, and placed on the knees of the worker. The pattern is picked out along the outline of the drawing, and small pins are stuck in at close intervals. Around these pins threads wound on bobbins of varying size are twisted and crossed to form the various meshes and openings. The pattern or "gimp" is formed by interweaving a much thicker thread. Needlepoint lace is the heavier lace, and has the appearance of greater strength, but pillow lace is very supple and is prized for the way it can be draped.

It is hard to say when and how lace had its origin, but it is generally agreed that lace, as we understand it today, was first made when Europe, emerging from the severe and formal Middle Ages, began to bedeck itself in a graceful and beautiful manner, although specimens of woven fabrics of lacelike character have been found in the ancient tombs.

During the first two centuries of lace-making men used more lace on their dress than women. It was used for ruffs, cuffs, collars, scarfs, and cravats, and ruffles of lace at the top of heavy boots were not

TWO BEAUTIFUL SPECIMENS OF OLD LACE



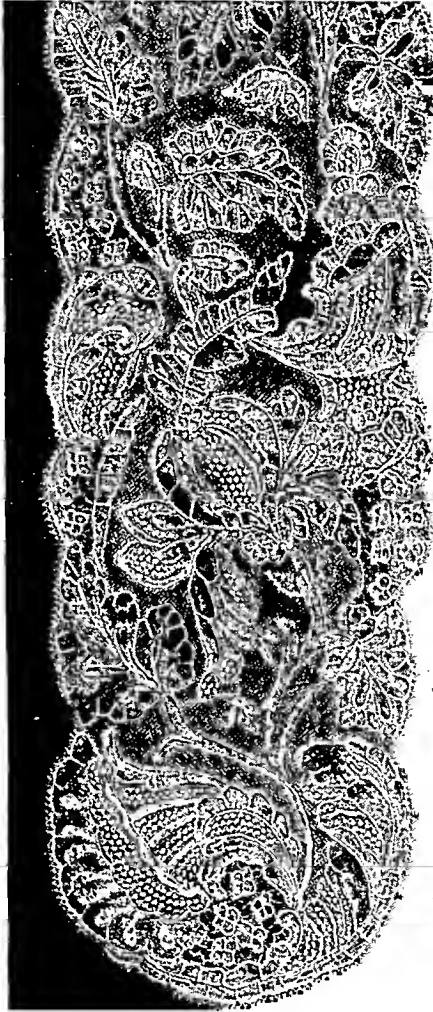
unusual. The most famous laces of this early time were those of Venice, Milan, and Genoa. Venice was celebrated for her points, and Genoa and Milan produced almost exclusively pillow laces. Such lace as was woven in the 16th and 17th centuries cannot be made in a commercial way today. Time is lacking and also the great skill that comes only through years of constant practice. The modern hand-made lace is often more artistic in design, but it cannot be compared with the old pieces preserved in libraries and museums in fineness of execution and thread.

As the industry developed and spread in those early days, the workers became more expert and artistic, and broke away from the stiff geometrical designs which mark the early laces. The various towns of Italy, France, Belgium, Spain, and elsewhere sought to make a product of exclusive pattern that would gain them prestige in the few great centers of commerce of that day. This explains the various names that were given to types of laces hundreds of years ago, and still persist.

Some of the better known hand-made laces are:

Alençon. A fine needlepoint lace named from the town in which it was first made. It has a closeness, firmness, and evenness not found in any other point lace. It was point d'Alençon, decorated with the bee motif, in which the magnificent cradle of the King of Rome was draped.

Antwerp. A pillow lace whose chief characteristic is the representation of a pot or vase of flowers with which it is always decorated.



The upper strip is an old specimen of the style known as "Point de Burano," while the stole is of Brussels point, sometimes called English point.

Blonde Lace. So-called because being made from raw silk, it was "fair," not white, in color. First made at Chantilly.

Bride. Lace whose ground is wholly composed of bars, without a net foundation.

Brussels. Best known variety is an application lace—a lace made by sewing completed patterns on a machine made net.

Chantilly. One of the blonde laces, both in black and white. The ground is very delicate and the pattern is in light or open work design instead of solid. Chantilly is used in making the mantilla.

Cluny. A plaited lace made in silk, linen, or cotton. The patterns are generally of antique or quaint description, mostly birds, animals, or flowers.

Crochet. Lace made with a crochet hook or whose pattern is so made and applied on net. Similar to needlepoint, but not equal in fineness to the best examples of the latter.

Filet Lace. A darned net lace which is one of the most widely used of the laces.

Irish. Chiefly a point lace made at Limerick entirely by the needle with very small meshes.

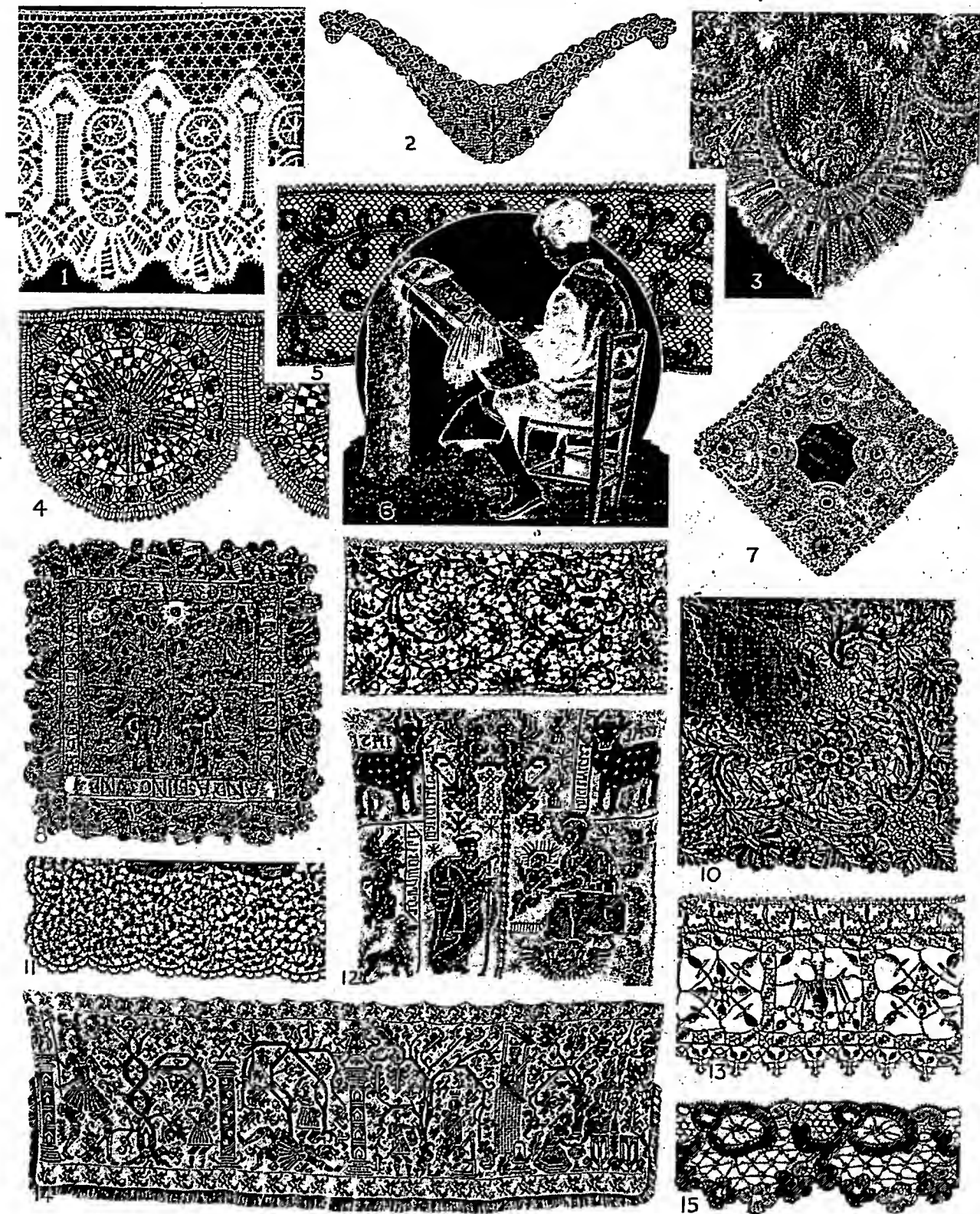
Macramé. A knotted lace made by tying short ends of thread either in horizontal or perpendicular lines and interweaving the knots so as to form a geometrical design.

Oriental. Lace made on embroidery machines. In broad sense, oriental laces refer to the product of the East, especially Chinese, Indian, Japanese, Persian, or Turkish laces. They are all remarkable for their great cost and the originality and boldness of the designs.

Honiton Pillow. Made in Honiton, Devonshire, England, celebrated for the beauty of its figures and sprigs. Queen Victoria's wedding dress was of Honiton and cost \$5,000. Honiton lace veils are treasured heirlooms.

Valenciennes. A solid and durable pillow lace having the same kind of thread throughout for ground and pattern. It is the most beautiful of all French pillow laces, and in early days was also the most expensive.

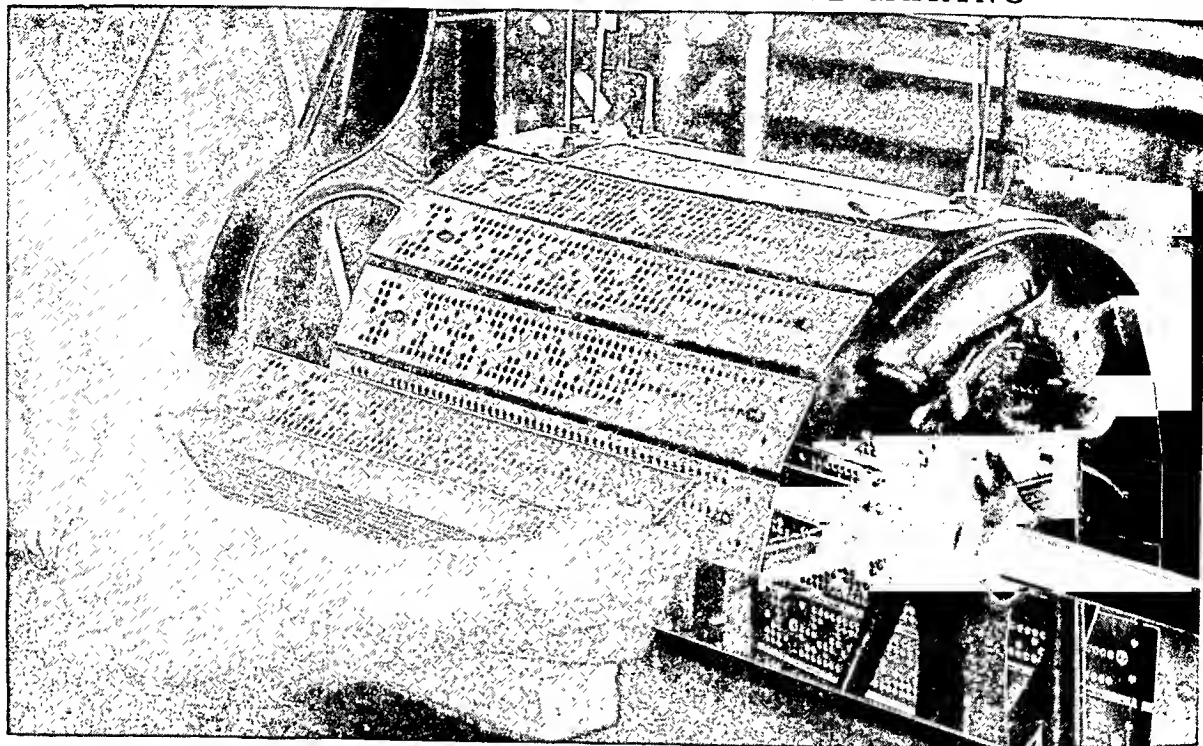
FIFTEEN FAMOUS TYPES OF HAND-MADE LACE



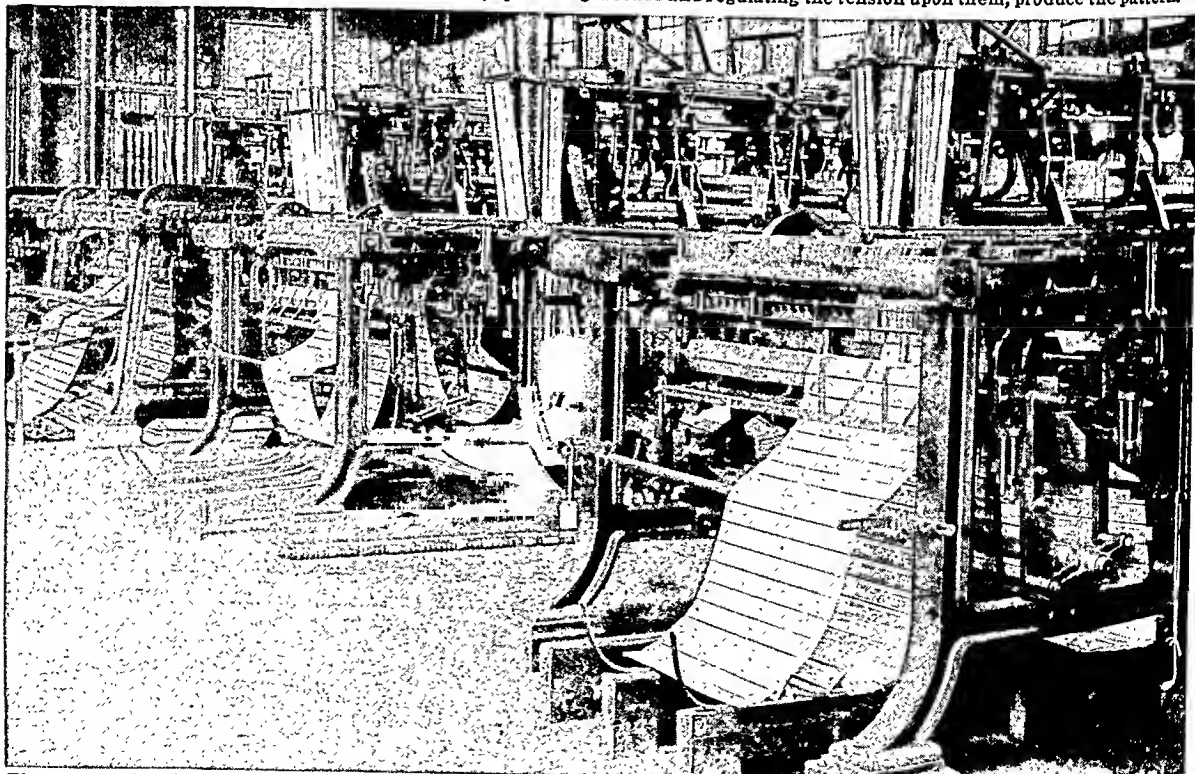
1. This 19th century Saxony guipure in black silk is typical. 2. The Maltese cross characteristic of Maltese lace is seen at the edge of this collar of cream silk. 3. Most delicate of bobbin lace is Chantilly. 4. A drawn-work motif is used in this Mexican lace of alve thread. 5. This bobbin lace of Milan is made as seen in picture 6, showing a girl of Valencia, Spain, at work with bobbins and pillow. 7. Netting, made with a long steel bobbin, adorns this cobwebby handkerchief. 8. English needlepoint, or point d'Angleterre, of the 17th century, forms this bit of church lace showing the temptation of Adam and Eve. 9. Venetian point lace, made

with a needle, is the strongest and most beautifully designed of laces. 10. Belgian duchess lace, 19th century, edges this handkerchief. 11. A strip of Irish carrickmacross, or cutwork, lace. It is embroidered linen, cut out and joined with lace stitches. 12. The nativity is shown in German 16th century filet. 13. The double eagle in this 18th century Italian lace is worked with bobbins; the edge is needlepoint. 14. A Spanish altar frontal in filet, early 17th century, tells the story of David and Goliath in four active scenes, with the killing of the giant plainly visible. 15. An interesting design is worked out in German bobbin lace.

GETTING READY FOR THE LACE MAKING

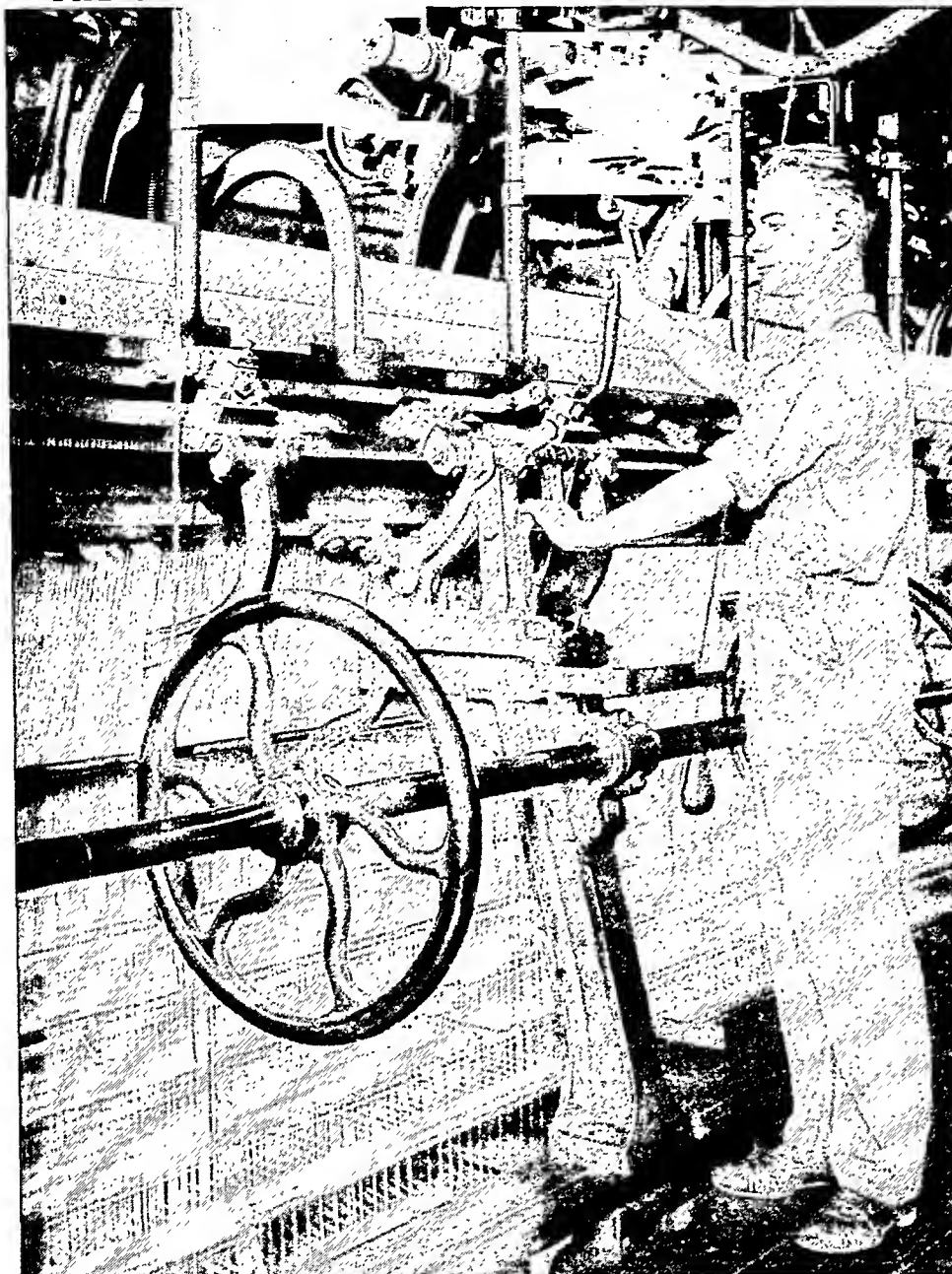


Here a skilled operator is fastening together into an endless chain strips of cardboard which he has punched according to the design furnished him by the lace draftsman. When ready the chain will be run through the lace machine to control its action. Each hole governs a needle in the machine, and the needles, by shifting threads and regulating the tension upon them, produce the pattern.



The chains of white strips are the cardboard "controls," punched and in place ready to regulate the play of needles within the machine. This control is exercised through steel "droppers" which penetrate the holes as they pass by, and which are connected through a complicated mechanism with the needles. You can judge how complex this control is, from the fact that in machines such as these there are 32,000 droppers at work, transferring the "messages" of the cards to the threads.

THE MACHINE STARTS—OUT COMES THE LACE



After all the preparations are complete, the power is turned on and the lace commences to appear on the long roller, as you see here. Tiny needles, set like porcupine quills on the roller, catch in the lace and keep it from wrinkling and stretching. When the machine is going, it will produce 60 yards of lace, with a total width of 224 inches, in 60 hours.

LACQUER AND SHELLAC. The shiny black and red finish we see on oriental trays, boxes, cups, and other articles is quite different from the finish we see on most automobiles. Yet both finishes have been called "lacquer finishes." This is because, during the last quarter century, the term "lacquer" has undergone a definite evolution. The original lacquer was made from the sap of the varnish tree (*Rhus vernicifera*). The tree grows abundantly in China where the art of lacquering was discovered more than 3,000 years ago. The oriental process requires 18 or 20 coats of lacquer over paper-covered or cloth-covered wood to get

the hard film desired. Each coat is rubbed with fine charcoal before the next one is brushed on. The Japanese learned to surpass the Chinese in this work, and by the 17th century the oriental art of lacquering became known as "japaning."

In Europe and America the early lacquers were simply spirit varnishes of which shellac is the most common example. These spirit varnishes were used both clear and colored, sometimes on wood but mostly on metals, such as brass, to prevent tarnishing and to give a soft, pleasing luster. Other spirit-soluble gums, such as sandarac and elemi, were often added to the mixture of shellac and alcohol to produce a lacquer which, after many applications, gave a durable and adherent coating to metalwork.

The Modern Synthetic Lacquers

In the years following the first World War, metal finishers and automobile manufacturers began to ask for coatings that would combine high resistance to wear with the fast-drying quality required for mass production methods of manufacturing. Chemists responded to this demand by developing an entirely new kind of lacquer. They added varnish resins to

solutions of nitrocellulose or of cellulose acetate. These pyroxylin lacquers dried very quickly with a hard, varnish-like finish.

Later the chemists discovered that many of the new synthetic resins (*see* Resins) can be substituted for part or all of the cellulose compounds to give lacquers of still higher quality. For instance, the addition of phenol-formaldehyde resins to cellulose lacquers improves their durability and adhering power. Exceptionally clear lacquers of this new type are made from acrylic resins and vinyl resins. The latter are particularly valuable for coating the inside of cans and

other food containers. Furfural resins, urea and thio-urea resins, and polystyrene are also used in lacquer.

But the most important of the new lacquers are those manufactured from alkyd (glyptal) resins. They were the first to be used on a commercial scale without nitrocellulose. It was found that by allowing the substances which ordinarily produce alkyd resins to react with certain drying oils, quick-drying lacquer was obtained. This hardens by oxidation to an extremely tough and resistant coating. The alkyd lacquers, like most of the other new types, resist the actinic rays of the sun better than the pyroxylin lacquers.

Plasticizers and Solvents

Some lacquers, especially of the nitrocellulose type, require a "plasticizer." This is a substance that makes the coating less brittle and helps the lacquer to flow more easily. The common plasticizers for nitrocellulose lacquers are dibutyl phthalate, tricresyl phosphate, and castor oil. The solvents used for nitrocellulose lacquers are of two classes, the "active" solvent which dissolves the nitrocellulose and the "inactive" solvent which dissolves the varnish-resin. Active solvents are liquids with a penetrating, sweetish odor and include amyl, ethyl, and butyl acetates, while inactive solvents include various alcohols, such as methyl, ethyl, and butyl alcohols. The newer lacquers require less expensive solvents. The alkyd resins are dissolved in toluene or xylene; the vinyl resins are dissolved in acetone.

Lacquers may be given transparent colors by adding coal-tar dyes. Opaque colors can be produced with any of the pigments used in paints if they are ground in Japan varnish instead of oil (see *Paints and Varnishes*). These pigmented lacquers are called "lacquer enamels" and are rapidly replacing the older paint enamels.

The Many Uses of Shellac

Shellac makes a smooth, glossy coating when it is properly applied. It is used on floors as well as on other surfaces where a quick-drying, tough, hard finish is desired. But a pure shellac finish does not withstand the dampness.

Shellac is being rapidly replaced as a coating by the new synthetic resins. But it continues to be used as a size or stiffening in felt hats and as the sealing material that fastens the glass of an electric bulb in its brass base. Toothbrush handles, imitation-ivory toilet articles, billiard balls, some types of phonograph records, and mouthpieces and receivers of telephones contain a portion of shellac. Huge quantities of it are used in electrical work, chiefly as a binder and in-

sulator, and it goes into oilcloth, glue, linoleum, cements, sealing wax, some inks, shoe dressings, varnishes for paper and leather, and protective coatings for navigation instruments.

How Insects Make the Lac Resin

Shellac is made from resin "sweated" by scale insects native to the Indian Peninsula (see *Scale Insects*). They are called lacs (*Tachardia lacca*) from the Hindustan word *lakh*, which means "hundred thousand." The name may come from the fact that thousands of insects are needed to make even a little shellac. Or it may be because the lacs swarm in vast numbers.

About 3 per cent of the world's shellac comes from Burma, Siam, and Indo-China. The rest comes from the Indian Peninsula's rainy hills and plains.

The lac grows from about one-fortieth of an inch to one twenty-seventh. Lacs attach themselves to tender shoots of the fig tree and some kinds of acacia. They suck sap through tiny sharp beaks, then give resin from their pores. The resin hardens into a protective shell.

In late summer and early fall Indian workers cut the twigs or scrape off the shells. The mass hardens even more into "stick-lac." They crush it with stone hammers or in a stone mill, separating it into fragments called "seed lac." After several washings, seed lac is dried and graded. Some is sold as a raw product, but most is made into shellac, button lac, and garnet lac. The most important is shellac, so named because the resin is stretched into thin sheets, or shells.

To make shellac, two workers pack seed lac in a long thin cloth bag and twist it over a charcoal fire. Hot resin falls to a stone slab, where workers stretch it to very thin sheets about four feet square. Garnet lac is unstretched sheet shellac. Button lac comes in little lumps about three inches in diameter, usually stamped with the maker's initials. Nearly all shellac and other lac are

made by hand. Workers increase the natural crop by spreading the lac colonies, tying twigs coated with lac eggs to other trees.

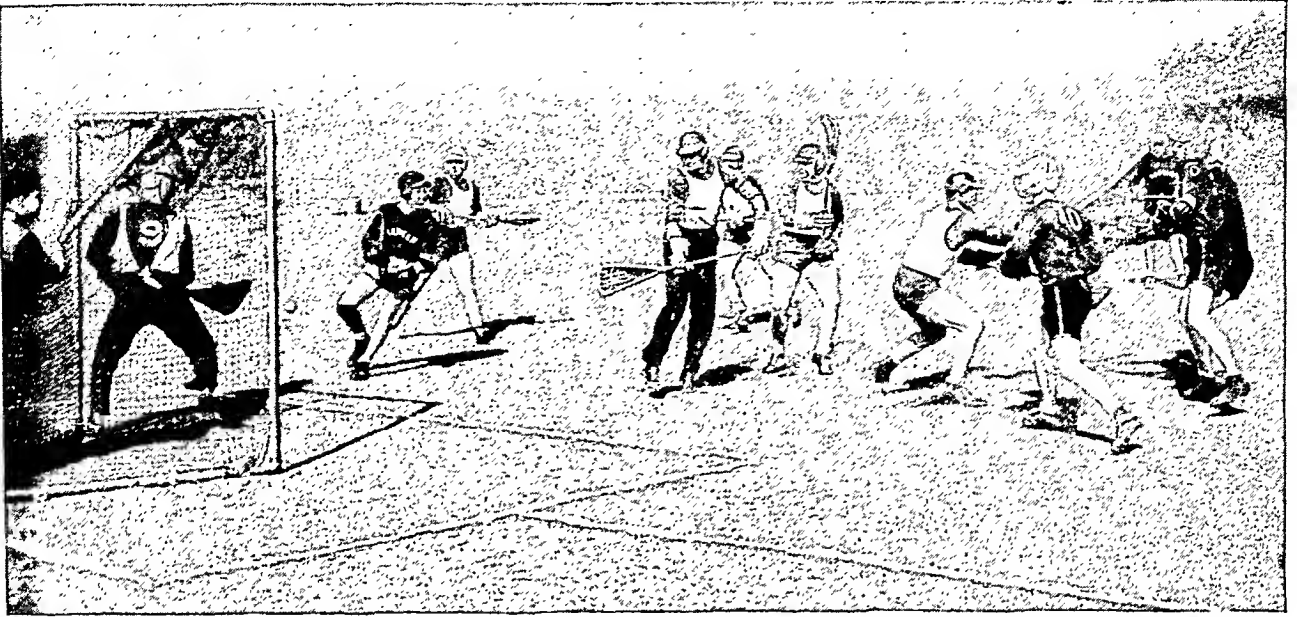
LACROSSE. The oldest organized sport played in America is lacrosse. French and English colonists found the Indians playing a fast, rough contest called "baggataway." White men in Canada took up the game about 1840. They revised the rules and named it "lacrosse" because the curved end of the playing stick resembled a bishop's cross or *crozier*. In 1867

FAST ACTION IN A LACROSSE GAME



This alert lacrosse player leaps high over a fallen opponent to catch the ball snugly in his crosse.

HOW A GOALKEEPER PREVENTS AN OPPONENT'S SCORE



Here the Harvard University lacrosse team (wearing black shirts) presses its attack close to the University of Pennsylvania goal. The goalkeeper has just used his crosse to block a shot and throw the ball toward one of his team mates.

an act of Parliament made lacrosse the national game of Canada. From there the game soon spread to the United States, particularly along the Atlantic seaboard. Today it is one of the most popular summer sports of eastern schools and athletic clubs.

Lacrosse is played with a rubber sponge ball $7\frac{3}{4}$ to 8 inches around and 5 to $5\frac{3}{4}$ ounces in weight. Each player carries a *crosse*, a 6-foot hickory stick shaped like a long-handled tennis racket. At the end of the crosse a 12-inch crook is bent at right angles to the main shaft. Within this crook a net of cord and rawhide lacings provides a pocket to catch and carry the ball.

Scoring a Goal

Near the two ends of the playing field is a goal, 6 feet wide and 6 feet high. The goal posts support a pyramid-shaped cord netting which slopes back to the ground 7 feet from the mouth of the goal. Each team tries to advance the ball to a position where it can be thrown into the opponent's goal net. One point is scored for each goal.

There are 10 men on a team—the *goalkeeper* defends his team's goal; the *point* is the

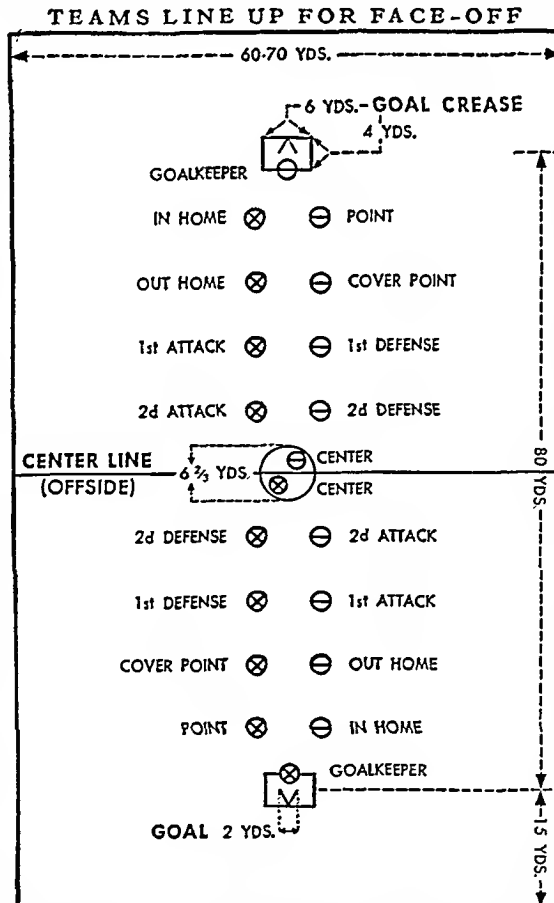
first defense man in front of the goal crease; the *cover point* plays ahead of the point; the *1st defense* and the *2d defense* aid in protecting their goal; the *center* represents his team on the "facing line" at the beginning of each quarter; the *1st attack* and *2d attack* carry the play into the opponent's territory; and the *out home* and *in home* provide much of a team's scoring punch.

Each player wears a padded helmet and a wire face mask to protect himself against an accidental blow from a crosse. Other equipment includes thick gloves, hip and shoulder pads worn under the uniform, and cleated canvas shoes to take a firm grip on the ground.

Each quarter of play starts with a *face-off* in the center of the field. The referee places the ball between the two rival centers. At a signal from the official each center tries to obtain possession of the ball by scooping it up in his crosse.

How a Lacrosse Team Advances the Ball

The team with the ball then works it toward the opponent's goal. It may be passed from one man to another or carried on the crosse. Opponents may knock the



This diagram of a lacrosse field shows the general positions taken by the players at the start of a game.

ball out of a player's crosse or "check" a rival by running in front of him.

A goalkeeper may bat the ball away with his hand but other players are not permitted to touch the ball or another player with the hand. Violation of this rule is a foul. The guilty player may be suspended from the game for one to three minutes; or the opponents may be given the ball to put in play (*free throw*). During the time a player is suspended his team continues to play without a substitute.

During play each team must have at least four men in their own (defensive) half of the field and no less than three men across the center line in opponent's territory. If a team violates this rule when it has the ball the opposing side receives a free throw. If the defensive team is guilty, one of its players is suspended from the game for one minute. A game is divided into quarters of 15 minutes each.

Lacrosse Inherited from the Indians

The Algonquin and Iroquois Indians often played baggataway with several hundred men on a side. The goals were placed half a mile or more apart and the size of the playing field was virtually unlimited. Competition between tribes was so keen that contests often became more like a battle than a friendly game.

When the Canadians took up the sport they ruled out rough practises that deliberately crippled a rival. But the modern game still demands a high degree of speed, skill, and endurance.

Women first played lacrosse at a girls' summer camp at Mount Pocono, Pa., in 1926. The originator of the game was Constance Applebee. Each team has 12 members, an additional defensive player (called *third man*) and an extra offensive player (the *third home*). The game consists of two playing periods of 25 minutes each.

LADOGA (*lädö-gä*), LAKE. No fewer than 70 rivers pour their icy waters into Lake Ladoga, Europe's largest lake, which lies in northern Russia near the Finnish border. It has an area of 7,000 square miles, about that of Lake Ontario. Ladoga is ice-free only about six months of the year. Severe storms, and rocks and shoals make navigation dangerous; so several canals have been built along the southern shore. Through these canals pass many vessels and rafts.

They carry timber, iron, granite, and other articles from the northern shores to Leningrad by way of the Neva River.

Through the broad Neva, the lake's surplus waters flow into the Gulf of Finland. A system of waterways, including the Svir River and Lake Onega, connects Ladoga also with the White Sea many miles to the north.

LADYBUG. The policemen of the insect world are the "ladybugs" or "ladybirds," which are really beetles. These small bright-colored creatures are familiar inhabitants of every orchard, field, and garden where they are always busy clearing plants and trees of insect pests. Friendly as they are to man, ladybugs are like hungry tigers among other insects. (See Scale Insects.)

Perhaps the commonest of this large family in the United States is the red species with two black spots; but among the 150 species are brilliant red ones with black, yellow, or white spots, shining black with red spots, and yellow ones with black or red spots—all arranged in the greatest variety of patterns. Only a very few kinds feed on vegetable food.

When annoyed, ladybugs defend themselves by ejecting drops of an acrid and ill-smelling liquid from their knee joints. Hence they are distasteful to birds and most other insect eaters, and, in fact, are preyed upon by almost no other creatures. The eggs are laid under the leaves of plants that have been infested with insect pests. As soon as the larvae hatch they start out "mopping up" their enemies until the plant is clean. When full grown, the larvae hang by their tails from a leaf and so pass through the pupa stage to become adult beetles. Scientific name of the common red ladybug, *Adalia bipunctata*.

LADY'S-SLIPPER. In May and June our native orchid, the fragrant and lovely lady's-slipper, or *moccasin* flower, blossoms in bogs, thickets, and moist, hilly woods. There are many species and all are native to North America, growing from southern Canada south to North Carolina and westward to the Rockies. The blossoms, one or more, are borne on a long, slender stalk. They have a pouchlike lip which helps in the reproduction of the plant. Bees and other insects forcing their way in and out of this pouch carry the pollen from flower to flower.

There are two yellow lady's-slippers, one larger than the other. Both have twisted petals of yellowish brown streaked with red or purple. In the larger variety the pouch is deeper yellow. The pink lady's-slipper has dark brown or green petals and a rose pouch veined with a darker color. (For illustration in color, see Flowers.) The showy lady's-slipper, a

spectacular species sometimes growing two feet high, has white petals and a rose and white striped pouch. It is the state flower of Minnesota.

Scientific name of small yellow lady's-slipper, *Cypripedium parviflorum*; large yellow lady's-slipper is the variety *pubescens* of the same species; pink lady's-slipper, *Cypripedium acaule*; showy lady's-slipper, *Cypripedium reginae*. Leaves oval, pointed, with riblike veins.

THE PINK LADY'S-SLIPPER



The bulblike part of the flower is the "labellum," or distinctive lower petal characteristic of all orchids, and its slipperlike shape is what gives the flower its name.

A HERO OF *Three* REVOLUTIONS

*The French Nobleman Who Devoted His Life and Fortune to the Ideal of Liberty—
His Services to the Cause of American Independence*

LAFAYETTE, MARQUIS DE (1757–1834). Only the name of Washington among the heroes of the American Revolution ranks above that of Lafayette, the gallant young Frenchman who generously placed his life and his fortune at the disposal of the fighting American colonists. By birth he belonged to one of the old noble families of France. His father had been killed in the battle of Minden, in 1759. The young man, whose family name was Du Motier, inherited from his father a castle and the title of Marquis, and from his mother a princely fortune; and at 16 he was married to a charming young wife, who belonged to one of the greatest families in France.

Three years later, when he was 19 and a captain in the French army, came the news that the American colonies had declared their independence of England, France's ancient foe. "At the first news of this quarrel," Lafayette afterward wrote, "my heart was enrolled in it." So he disobeyed the commands of his king and his angry father-in-law, purchased a ship, and after many difficulties sailed for America. Since he offered to serve without pay, Congress (July 31, 1777) gave him the rank of major-general and placed him under Washington, who soon became a firm friend—almost a father—to the young Frenchman.

Lafayette's services were of inestimable value. He proved a good officer and a wise adviser. He was slightly wounded in his first battle, that of the Brandywine, in September 1777. Next year he was commended for a masterly retreat from Barren Hill and played an honorable part in the battle of Monmouth and in the Rhode Island expedition.

More important, however, was his influence in inducing the French government to sign a treaty of alliance with the colonies, in 1778, without which they

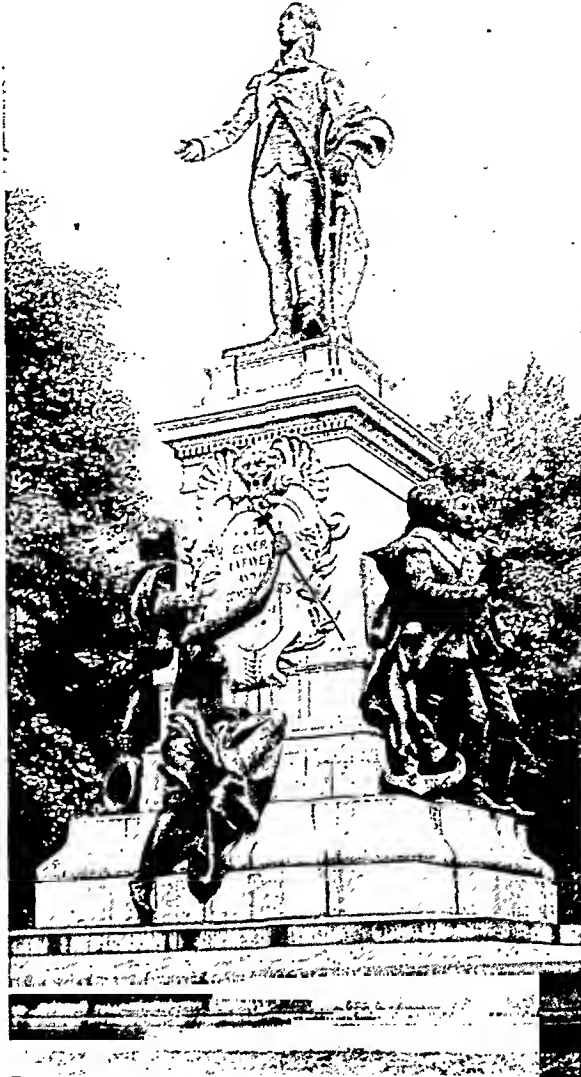
could not have won the war. To aid this alliance he was back in France in 1779; but he returned to America in time to assist in the Virginia campaign, and in the final movements which led to Cornwallis' surrender at Yorktown in 1781. He then went back to France, loaded with the favors of his adopted country, and was welcomed with every token of appreciation by his sovereign and fellow countrymen.

Lafayette's love for liberty naturally led him to be one of the liberal French noblemen who favored the Revolution of 1789 in his own country. He was elected to the Estates-General, and in that body presented a draft for a Declaration of Rights modeled on the American Declaration of Independence. On the day after the storming of the Bastille, he was made commander-in-chief of the new National Guard, organized to safeguard the Revolution. It was he who proposed for the Revolutionary armies the famous tricolor—the "red, white and blue"—of modern France.

For the next three years Lafayette played a large

part in the history of France. He rescued the queen from the mob of Oct. 5, 1789, and issued orders to stop the king when he sought to flee to the hostile armies outside France. But gradually Lafayette became dismayed at the growing excesses of the Revolution. As the head of an army raised to defend France against Austria, he planned to overthrow the Jacobins and support a limited monarchy. He was therefore proclaimed a traitor, and to escape arrest and the guillotine he fled into Belgium, where he was imprisoned by the Austrians. For five years, 1792–97, he there remained in captivity, until his release was obtained by Napoleon.

Lafayette disapproved of the rule of Napoleon, however, and took no part in public affairs until after



The monument erected in Washington in memory of the great assistance rendered by Lafayette and his companions during the American Revolution.

his overthrow. Under the restored Bourbons he played no important part until they attempted to bring back the old absolutism. Then he led the opposition, and in 1830 took part in his third revolution. He commanded the Army of National Guards that drove Charles X from France, and placed on the throne Louis Philippe, "the citizen king."

Twice after the close of the American Revolution Lafayette had visited the United States—in 1784 and 1824. On the latter visit, Congress voted him \$200,000 and a township of land. This was a welcome gift, for his own property had been confiscated during the French Revolution. His death, in Paris, saddened both nations. He was not a great general or statesman, but he was a life long lover of liberty and played an important part in three great revolutions.

LAFITTE (*lâ-fêl'*), **JEAN** (1780?-1826?). Patriot and privateer? Or smuggler and pirate? Lafitte has been called all these names. Oddly enough, they all fit him.

Lafitte is partly known only by legend. A dozen French cities are mentioned as his birthplace. His exact birthdate is unknown. Was he the son of a noble family beheaded in the French Revolution? Or was he the son of a sailor? His later life adds some weight to the second theory.

We do know that Lafitte appeared in New Orleans about 1806. Vague stories of piracy clung to him at the time. He set up a blacksmith shop and a store. But these were only false fronts for his real business of selling smuggled goods captured by privateers and pirates from ships sailing the Caribbean Sea.

For two years Lafitte prospered. He was handsome, well educated, pleasant, and he won many friends. When importation of slaves into the United States became illegal in 1808, smugglers had a new source of profit. Lafitte became the leader of the privateers and smugglers who had a base on Grand Terre Island, 60 miles south of New Orleans. He settled their quarrels and united them. Grand Terre became the center from which Lafitte controlled imports into New Orleans. He insisted that his captains operate as privateers, legally commissioned to capture ships and cargoes of enemy nations. At the time, this meant British and Spanish ships.

Other business suffered severely from Lafitte's growing monopoly, and protests led to indictment of Lafitte and his men as pirates. Commodore Patterson

of the United States Navy led a force, which Lafitte had supposed was preparing for action in the War of 1812, and in June 1814 destroyed Grand Terre. Nine ships and many men were captured. Lafitte escaped.

While these actions against Lafitte were going on, an English captain offered him \$30,000 and a commission if he would help the British attack New Orleans. Instead, Lafitte informed Governor Claiborne of the intended attack and offered his help. After first refusing, the governor and General Jackson accepted Lafitte's offer. He and his men fought well

enough to win a commendation from Jackson for their part in the victory. Later President Madison pardoned them.

But Lafitte had seen his best days. Many of his men deserted him as he sailed around the Caribbean for three years, seeking a new base of operations. In 1818 he finally found one on the island that is now Galveston, Tex. But in 1821, Lieutenant Kearney of the United States Navy ordered Galveston evacuated. From then on, Lafitte operated from Mujeres Island, off Yucatan, but his forces were small. He died about 1826 in a native hut at Teljas, on the Yucatan mainland.

Lafitte was everything that men have called him. And he was more. He was the last great figure in history's record of privateers and pirates.

LA FONTAINE, JEAN DE (1621-1695). The world has always loved a good storyteller. One of the best was La Fontaine, author of the beloved 'Fables.' French children know his

simple verse stories by heart, and adults never tire of their wisdom. (See Fables.)

His birthplace was Chateau-Thierry in the French province of Champagne. There his father was a well-to-do government official in charge of forests. Young Jean went to school at Reims, and in 1641 to the Oratory of St. Magloire in Paris, intending to become a priest. But he never took study seriously and returned home to enjoy a gay and social life. In 1647 he succeeded to his father's post, and in the same year he married. However, he soon separated from his wife and went to live in Paris.

La Fontaine was a genius at making and keeping friends. Rich patrons took a liking to his wit, and their bounty largely supported him. A kinsman introduced him to Fouquet, finance minister to Louis XIV, who granted him a pension in return for four poems a year. La Fontaine was also befriended by the Duke and Duchess of Bouillon, and for them he wrote several

LAFITTE—PATRIOT OR PIRATE?



This old woodcut shows Jean Lafitte as a bold, adventurous-looking man, ready for action.

books of prose tales. From 1673 to 1693 he lived at the home of Mme. de la Sablière, a wise and studious woman. In 1684 he was elected to the French Academy, the greatest honor a French writer can receive. About 1685 he met M. d'Hervart, his last patron. With him he spent the last two years of his life.

The first volume of 'Fables' appeared in 1668, followed by two more in 1678 and 1694. Today only students read his other books but the 240 'Fables' are read everywhere. The 'Fables' are both realistic and fantastic—about all types of people and about animals who act like men. In one, for example, a fool thinks it wrong for big pumpkins to grow on small vines and little acorns on great oaks. He changes his mind when a falling acorn awakens him from a nap under an oak tree.

LAGERLÖF (*lä' gēr-läf*), SELMA OTTILIANA LOVISA (1858-1940). The big forests, rough rocks, and merry rivers of southwestern Sweden are poor in wealth, but they are rich in dreams. There, among tales and legends which the centuries have woven like mists about the lakes and valleys, a delicate girl caught these dreams and by them changed the commonplace region into fairyland. With an art all her own, Selma Lagerlöf carries us into far fantastic worlds where through strange eyes we catch glimpses which give daily happenings a meaning we quite miss in the busy work-a-day world. She speaks to both head and heart. Her fancy mingles facts in magic raiment, but never hides them.

To make a school textbook, she called to her aid the elf of Northland myth. Together they seated the boy Nils on the back of Morten Goosey-gander and sent him with the wild geese to learn of the geography, plants, animals, industries, and folk-lore of his country; and 'The Wonderful Adventures of Nils' became a children's classic, translated into seven languages before its tenth birthday.

The life of Selma Lagerlöf had almost the romance she gave to her stories. As a little child she was unable to roam about the picturesque country surrounding the old homestead of Marbacka. But by the fireside she listened to oft-repeated weird tales with which the Northland abounds. When not listening she read, or wrote wild strange stories for her own amusement. At 33 she was an unknown school-teacher. Then her first published book, 'Gösta Berling', brought her swift fame. What the world calls life, she had never known. What it calls doing, she had never done, and yet within 20 years she was known and loved throughout the western world, not alone as the winner of honors rarely bestowed upon women—among others the \$40,000 Nobel prize for literature—nor as one of the foremost women writers of the age, but as a teller of rare fairy tales that are read by young and old alike.

In the United States, her fame came through the publication of her 'Christ Legends' and 'The Wonderful Adventures of Nils', translated by Mrs. Velma Swanston Howard. But her other books have now

become almost equally popular and have all been translated and published in English.

Her works include: 'Gösta Berling' (1891); 'Invisible Links' (1894); 'Miracles of the Anti-Christ' (1897); 'From a Swedish Homestead' (1899); 'The Wonderful Adventures of Nils' (1907); 'The Outcast' (1918); 'Mårbacka, the Tale of a Manor' (1922); 'The Ring of the Löwenskölds' (1931); 'Memories of My Childhood; Further Years at Mårbacka' (1934); 'Diary of Selma Lagerlöf' (1936); 'Jerusalem' (1937).

LAKES. Technically a lake is an inland body of water, larger than a pool or pond, that is surrounded by land. Actually, however, the name is given also to the widened parts of rivers, and to bodies of water which are in direct connection with the sea; while other inland bodies, like the Caspian and Dead seas, are true lakes although not so called. Like Great Salt Lake, these seas are salty because they have no outlet to the ocean, but lose their water by evaporation, which leaves an excessive amount of mineral matter behind. The Caspian Sea is the largest inland body of water in the world, while Lake Superior is the greatest of fresh water lakes.

Lakes are found in any depression of the land surface where there is a sufficient supply of moisture. These depressions may be due to various causes: (1) Hundreds of thousands of lakes owe their origin to the great glaciers which in ancient times filled many river valleys with their deposits, or created new hollows by gouging out rock or distributing their debris unequally. It is owing to glacial action that North America has larger and more numerous lakes than any other continent. (2) Many lakes are formed by obstructions in river channels caused by lava flows, land slides, the operations of the beaver, or tributaries that bring down sediment which blocks the main stream and forms a lake. The abandoned "meanders" or windings of a river often become the sites of lakes, and are called "oxbow" lakes or bayous. (3) Occasionally the warping of the earth's crust creates depressions, as in the case of Lake Geneva, which was formed by the subsidence of part of the Alps. (4) Sometimes "sink lakes" are formed by the sinking of land due to the washing away of underlying soluble rocks. (5) Lakes are often found also in the craters of inactive volcanoes; thus the deepest fresh-water lake in North America is Crater Lake in Oregon, where the volcano formation is perfectly evident.

Many European lakes, especially in Switzerland and northern Italy, show signs of having been inhabited by prehistoric "lake dwellers," whose houses were built on wooden piles driven into the lake bottom along the shore. Study of the bones, implements, and other remains found in the mud and sands underlying such sites gives us much interesting information of the life of these early peoples who lived 10,000 or more years ago. (See also Earth, and separate articles under the names of different lakes.)

LAMB, CHARLES (1775-1834). As long as the English language is spoken or read, Charles Lamb will be remembered as one of the most lovable figures in English literature. He was not only the most delight-

ful of essayists, but the cheeriest of companions and the best of friends to a number of other brilliant literary men, and he was one of the bravest spirits that ever lived.

He was born in the heart of London in the Inner Temple, a great rambling old building filled with lawyers' offices and lodgings. His father, whom he described as "a man of incorrigible and losing honesty," was a poor lawyer's clerk. At the age of seven Charles was sent to Christ's Hospital, the famous "Bluecoat" school. Here he met another poor boy who became his lifelong friend—the poet Coleridge. These days are delightfully described in his essay, 'Christ's Hospital Five-and-Thirty Years Ago'. At the age of 17, Lamb became a clerk in the accountant's office in the East India House. There he remained until he retired on a pension 33 years later.

When he was 21 the quiet of his life was broken by a terrible calamity. His sister Mary fell a victim to the insanity that was hereditary in their family. She killed her mother, and was confined in an asylum. She recovered temporarily, and was released upon her brother's solemn promise to care for her the rest of her life.

Thenceforth Charles Lamb sacrificed everything for his sister. When her malady recurred, he would take her by the hand and brother and sister would walk mournfully to the asylum. But in the intervals which he called "between the acts," there was much that was cheerful and beautiful in their life. They became famous for their evenings "at home." The brightest wits of London gathered for talk and laughter and good cheer. Mary Lamb shared in many of her brother's literary labors. They wrote together the 'Tales from Shakespear' which have given pleasure to so many children.

The 'Essays of Elia'

Although he began his literary career by writing poetry and first won distinction by his literary criticism, Charles Lamb's fame today rests chiefly on the essays written under the name of "Elia." (He intended this pseudonym to be pronounced *ĕlĭ-ă*.) In these essays he has taken the most trivial subjects, chosen apparently at random, and put into them his own whimsical, pathetic, quaintly humorous personality. Whether he writes 'A Chapter on Ears', 'Imperfect Sympathies', 'The Praise of Chimney-Sweepers', 'Old China', or a 'Complaint on the Decay of Beggars', he says something worth while and says it in his own inimitable way. Probably no essay in the English language has aroused more laughter than his 'Dissertation on Roast Pig', and none is more full of pathos than his beautiful 'Dream Children'. Lamb's style has an old-fashioned flavor—described by himself as a "self-pleasing quaintness."

In addition to the 'Essays of Elia', Lamb's most important prose works include the critical notes in his 'Specimens of English Dramatic Poets contemporary with Shakespeare', 'The Adventures of Ulysses', and his romance 'Rosamund Gray'. His best-known poem is 'The Old Familiar Faces'.

LAMPREY. Fishermen everywhere dread the eel-like lamprey, for it destroys millions of valuable food fish every year. The lamprey has no jaws, but uses its cup-shaped mouth as a sucker, attaching itself firmly to larger fish. Within its mouth is a circle of sharp projections, and its tongue is similarly equipped with rasplike "teeth." With these the lamprey scrapes away at the flesh of its host.

Lampreys are distributed throughout the world. They thrive in fresh water as well as in the sea. Before the second World War sea lampreys invaded the Great Lakes through the St. Lawrence River canals. Lake trout were their favorite prey. They have virtually destroyed the trout fisheries of Lakes Michigan and Huron and are now threatening Lake Superior.

Like the salmon, lampreys migrate up streams to spawn. Soon thereafter they die. The eggs hatch as larvae. The larvae drift downstream until they reach mud flats. There they bury themselves with only the head protruding. They feed on minute organisms that float past their mouths. The larval life lasts four years. Then the larva develops into a mature lamprey, emerges from the mud, and drifts down to the lake or sea where it lives for about a year. It grows two to three feet long. In late spring the lamprey, now about five years old, re-enters the streams to spawn and die. Control measures, being developed by the United States and Canadian governments, are designed to kill the fish as they enter and leave the streams.

Besides the naturalized sea lamprey, several relatively harmless native lampreys inhabit the lakes and streams of the United States. The lamprey's skeleton is of gristle. For this reason lampreys rank below the bony fishes. Scientific name of sea lamprey, *Petromyzon marinus*. (See also Fish; Migration.)

LAMPS. Torches and campfires gave man his first way to light the darkness. Even today they afford the only night light used by some primitive peoples. The Shetland Islanders once made a torch by sticking a wick in the throat of a fat stormy petrel. The Indians of the North Pacific coast made similar use of a little dried fat smelt called the candlefish. The prehistoric cave dweller's lamp was made of an animal's skull, a sea shell, or a hollowed stone. With a rude wick of moss, vegetable fiber, or rushes, it burned animal fat or fish oil. Eskimos and some Laplanders use this type of lamp today.

Lamps of Long Ago

Many well-wrought terra cotta lamps have been found in long-buried cities in Mesopotamia. Some may date back to 7000 or 8000 B.C. The oldest known metal lamps, made of bronze by prehistoric lake dwellers, have been found in Swiss lakes. The traditional "lamp of learning" is a type used in ancient Greece and Rome. It was a shallow round or oval dish of terra cotta or metal. It had a handle at one end and a spout for a cloth or tow wick at the other.

Lamps of much the same shape, called "Betty lamps," came with the Pilgrims on the *Mayflower*. Of Dutch origin, they were made first of iron, then of tin or brass. Benjamin Franklin is said to have

improved lamps by placing two wicks close together to give brighter light and less smoke, and by using flat wicks made of loosely braided cotton.

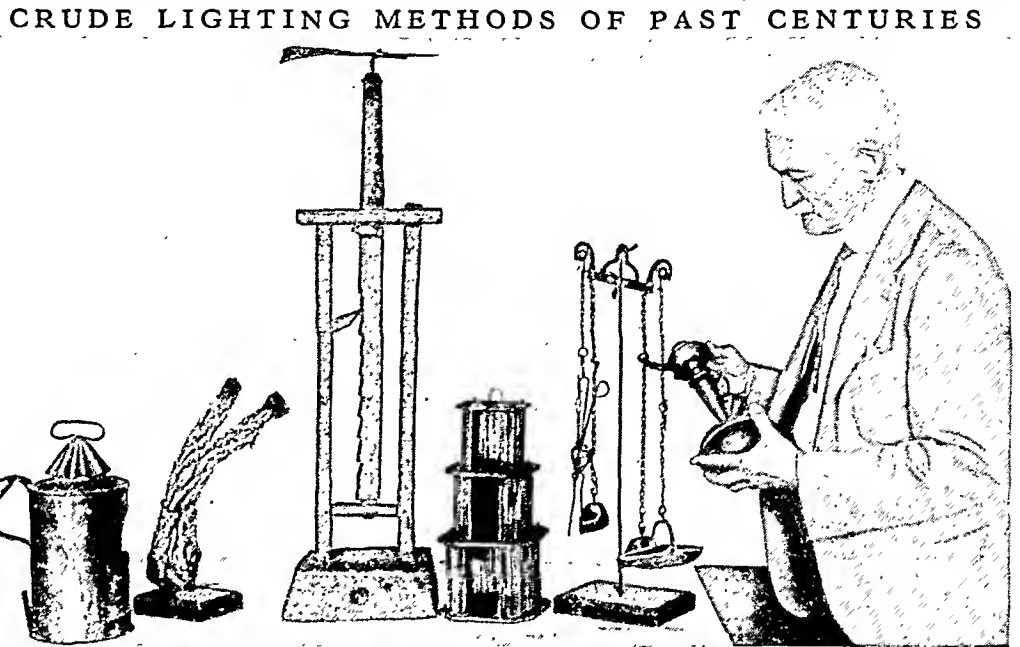
In the 18th century, Aimé Argand, a Swiss chemist, revolutionized lamps by placing a flat wick around a hollow tube, allowing air to reach the center of the flame. With more air and a better draft, the flame burned more carbon and gave less smoke. By adding a glass chimney Argand made the lamp completely smokeless. He was

granted a French patent on this improvement in 1784.

Best known of the many modified Argand lamps are the Rochester and the "student's lamp." The former has the oil reservoir below the burner; the latter has the oil in a raised tank flowing by gravity to the wick.

Until about 1845 lamps burned animal fats, whale, fish, and vegetable oils. Whale oil was burned in the lanterns of lighthouses. Camphene, made from turpentine, was among the first substitutes for animal oils, but its tendency to explode kept it from coming into general use. Kerosene, safe and cheap, came into general use about 1860. It was called coal oil, mineral oil, paraffin oil and petroleum oil. (See Petroleum.)

Lanterns, portable lamps to be carried in the



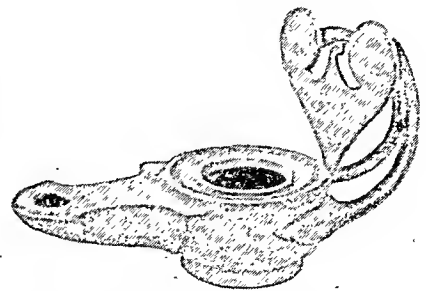
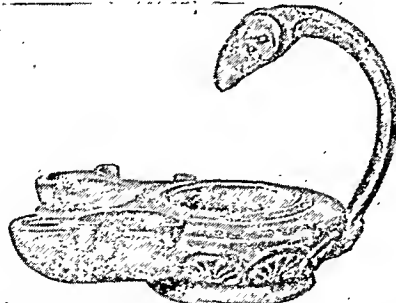
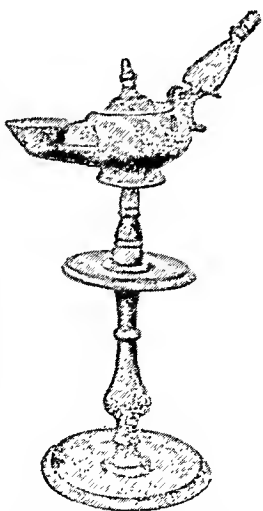
Six old-style ways of lighting the dark are shown above, from a collection in the Smithsonian Institution. At left is a copper lantern of Revolutionary War days, with a panel of horn to emit light. Next comes a Spanish rosin torch, used in the Middle Ages. Third is a Finnish splint holder, in which a piece of splint burned to light a home of the Iron Age. Fourth is a firefly lantern used in the West Indies a century ago. The lamp beam with its four chains and boat-shaped lamp is 900 years old. In the scientist's hands is a lamp of 18th-century England.

wind, were used in ancient times at the head of marching armies, in religious rites, and by soothsayers in their auguries. Before the introduction of the glass chimney, a lantern was usually a candle shielded by a metal guard with holes cut through to shed light. In the 16th and 17th centuries, horn replaced the metal guard; hence came the term "lanthorn." Later oil-burning lanterns were used, with glass chimneys.

Railroad men still signal at night with oil lanterns as well as electric. The dark lantern, or "bull's-eye," has a round lens to concentrate the light. A sliding shutter may cover the lens.

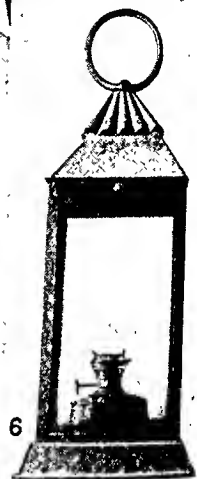
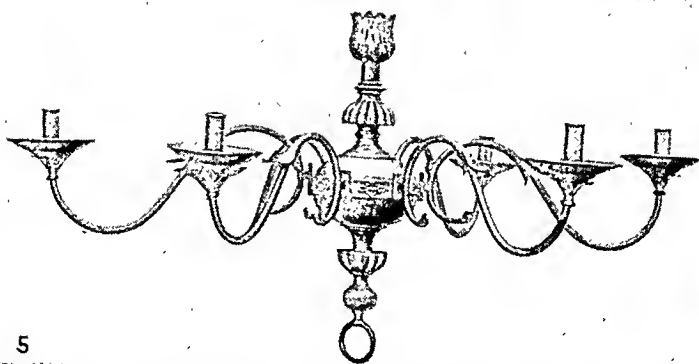
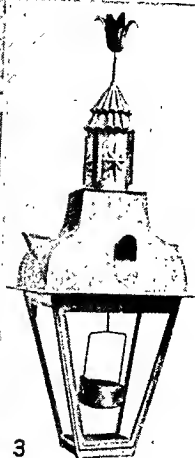
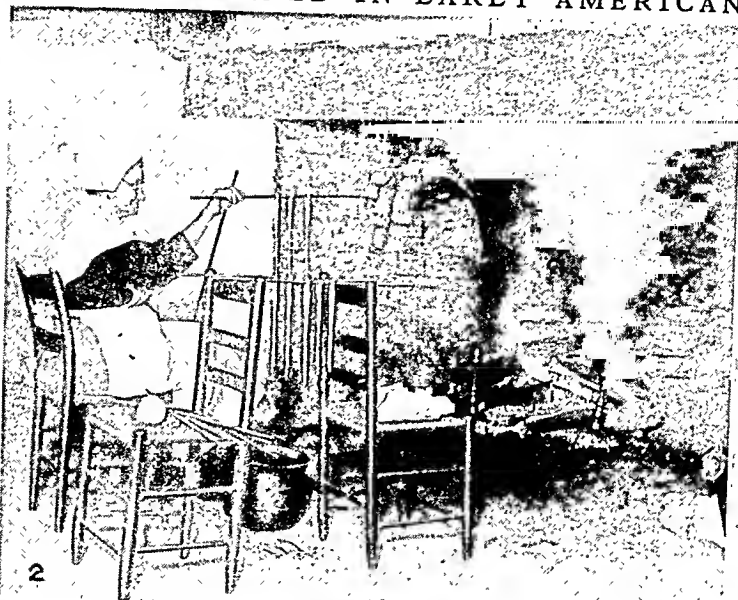
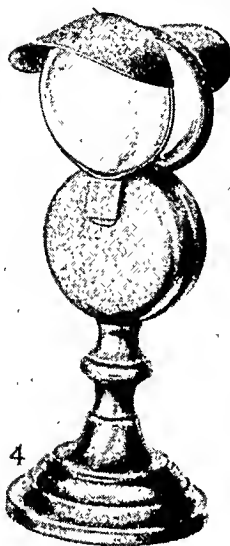
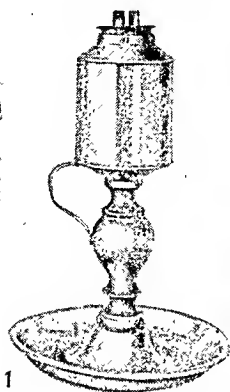
The Phoenicians may have been first to make candles. The Old Testament mentions candles which were probably of beeswax. Most candles used in religious services are still made of beeswax. Candles of animal fat appeared about the 2d century A.D., and in the 11th century the English made candles by dipping sticks in tallow. Later came candles of spermaceti,

LAMPS OF THE GREEKS AND ROMANS



The flickering oil lamps of Greeks and Romans made up in beauty what they lacked in effectiveness as lights. At left is a Greek lamp on a stand. From the spout projected a wick. The Romans imitated this "lamp of learning." The second picture shows a two-burner Roman lamp, with ram's-head handle, dredged up from the river Thames in England. It is of bronze, as is the third lamp, used in Rome about the first century A.D. Such lamps burn today with olive oil before shrines in Italy.

LIGHTS THAT BURNED IN EARLY AMERICAN HOMES



1. The housewife who owned this double-wick whale-oil lamp in the early 19th century must have burnished its pewter with great pride. 2. Candle-dipping, by which the first colonists laboriously obtained light, is being demonstrated on the hearth of the Elting house, built in New Paltz, N. Y., in 1698. 3. A gracefully designed lantern used in Pennsylvania in the 18th century perhaps once had horn panes to protect the oil-burning lamp. 4. Quite a triumph for its day is this pewter bull's-eye lamp of the early 19th century. 5. Carved in elegant lines is this chandelier of gilt, iron, and wood, which adorned a colonial parlor between 1750 and 1775. 6. This lantern of 1780 has a screw to move the wick. (1, 3, 4, 5, Metropolitan Museum of Art.)

a wax from the heads of whales, and "composites," of stearic acid and stearin, popular about 1830.

The wick of the early candles was only partly used up since it remained in the flame shielded from the oxygen of the air. As a result, the light was soon dimmed. Snuffers, or scissors with a small box on one side, were used to cut away and catch the top of the wick. About 1825, wicks were so woven as to cause the burned portion to fall to one side where oxygen helped to destroy most of it. Later it was discovered that wicks which had been saturated in boric acid burned without leaving any residue.

In American colonial days, candles were made by dipping a wick into hot tallow, allowing it to cool, and re-dipping many times. These "tallow dips" were then thrust into hot water and shaken, to point or "feather" them, and so keep them from dripping. Sometimes they were made in molds.

Rapid modern machinery molds candles in large quantities. Candles today are usually of paraffin, a

refined wax obtained from crude petroleum, strengthened with a mixture of stearic acid (*see* Paraffin). The pleasant light of candles is chiefly used in religious services and to give charm to homes.

The candlestick has long been a handsome ornament. The Greeks and Romans made beautiful candelabra, and in Europe artists wrought fine designs in iron, bronze, and copper for candlesticks. In the 17th and 18th centuries candlesticks of silver, silver plate, and Sheffield plate, as well as of china and glass, glittered on elegant tables.

Brighter light became available when illuminating gas was introduced in the United States about 1806 (*see* Gas, Manufactured). Gas lighting spread rapidly after the development of the Welsbach mantle until it was replaced by the incandescent electric lamp. The light of the first electric lamp was harsh and glaring. But the efficient modern incandescent and fluorescent lamps which were developed from it brought the effective lighting of today. (*See also* Lighting.)

LANCASTER. The claim of Henry, Duke of Lancaster, to the English throne was accepted by Parliament in 1399, after Richard II was deposed for misgovernment; and as Henry IV, 1399-1413, he became the first of the Lancastrian dynasty. His hero son Henry V, 1413-22, and the latter's weak and incompetent son Henry VI, 1422-61, are the only other members of the family who wore the crown. The rival claims of the house of York led to the bloody Wars of the Roses. During these wars, Henry VI was deposed and his son, the last of the direct Lancastrian line,

perished (*see* Roses, Wars of the). Because the Lancastrian kings owed their throne to Parliament, the power of that body grew greatly in their time.

The English county of Lancaster, from which comes the name of the family, lies in northwestern England, fronting on the Irish Sea. It is now the chief seat of the cotton manufactures of England and one of its busiest and most populous counties. The county seat, Lancaster, has a castle built by John of Gaunt, the father of Henry IV and patron of Chaucer. Population of the city (1951 census, preliminary), 51,650.

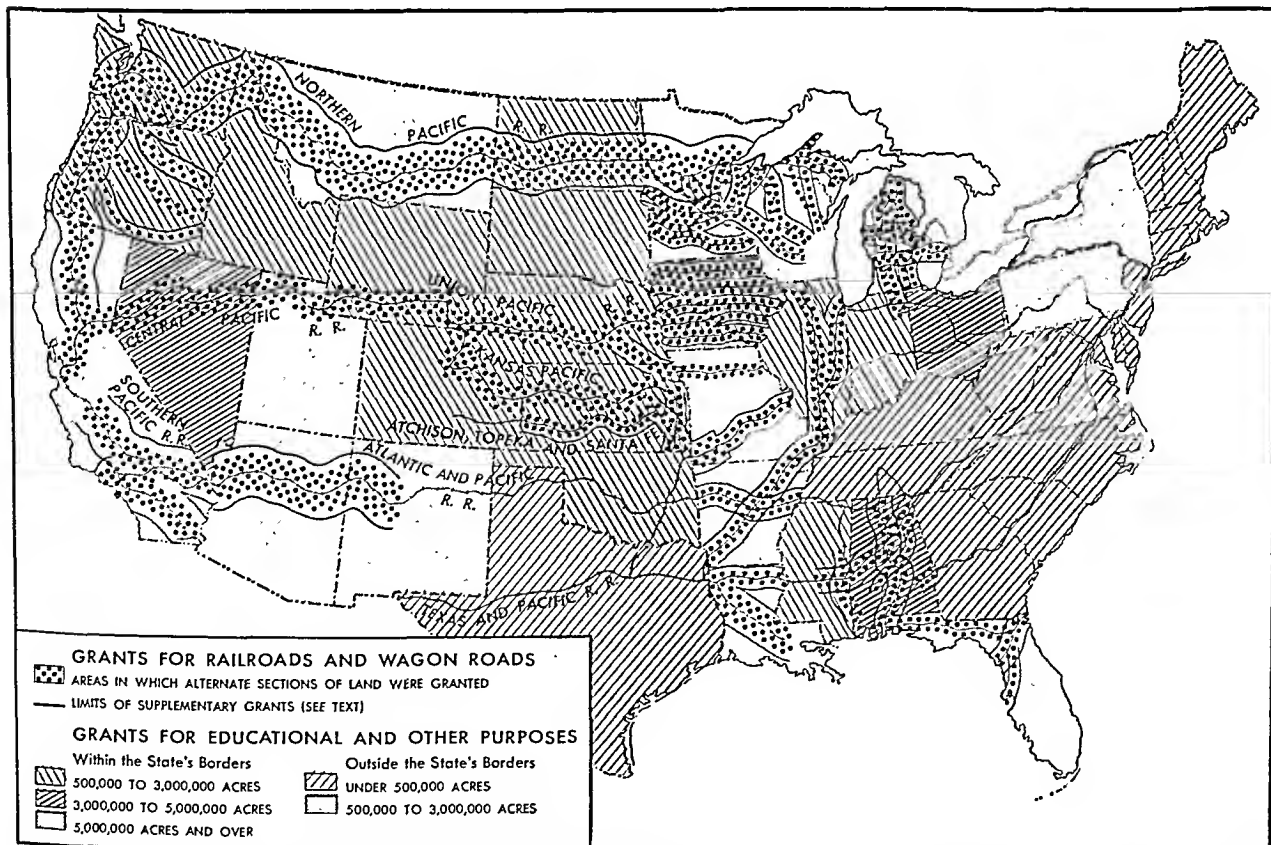
How PUBLIC LAND Helped AMERICA GROW

LANDS, PUBLIC. At one time or another the United States government has been the "private owner" of about three-quarters of the land within the forty-eight states. Most additions to the national area consisted of land held originally by the Indians. Since among the Indians no individual ever owned land, the government became owner of the new lands wherever it made treaties by which the Indians surrendered their "hunting rights."

Thus the United States, almost alone among modern nations, had a large portion of a rich continent at its disposal for national purposes. As soon as the Federal government was formed, it began using public lands to promote settlement (*see* Northwest Territory).

Land was sold to "land companies" and individuals. Tracts were given to men like Lafayette, who had performed distinguished service. Early in the 19th century the government began giving land to companies in return for agreements to build roads, canals, or railroads. Railroad grants alone amounted to about 207,000 square miles, or about $\frac{1}{15}$ of the national area. These grants consisted of alternate sections of land within a tract extending a certain number of miles on each side of the right of way. The total width of the tract varied from 10 to 80 miles. If some alternate sections in this area had already been taken, the railroads could make up the loss in supplementary grants outside the original tract.

GRANTS OF PUBLIC LAND FOR TRANSPORTATION AND EDUCATION



Every state has received federal grants of land for educational and other purposes. The 29 states shown in orange (solid and hatched) received land from the public domain within their own borders. The others, in blue, contained little federal land, but they were given the right to sell land in other parts of the public domain. Special grants were given to railroads and wagon roads.

Settlers were allowed to "pre-empt" unoccupied land by a short residence and payment of \$1.25 an acre. In 1862 Congress passed the first Homestead Act. This permitted any citizen over 21 years old

or any head of a family to acquire 160 acres of public land by giving legal notice of his intention (called "making entry"), then living upon the land for five years and making certain improvements. Later laws provided for homesteads up to 640 acres in semi-arid regions or where the soil was poor. Former soldiers could count their wartime service as part of the five-year residence period.

Huge grants were made to states for the support of public education. Until 1850 each new state admitted to the Union usually received $\frac{1}{8}$ of its area for support of public schools, and after 1850, $\frac{1}{16}$. The Morrill Acts of 1862 and 1890 provided grants to states for agricultural colleges (see Education).

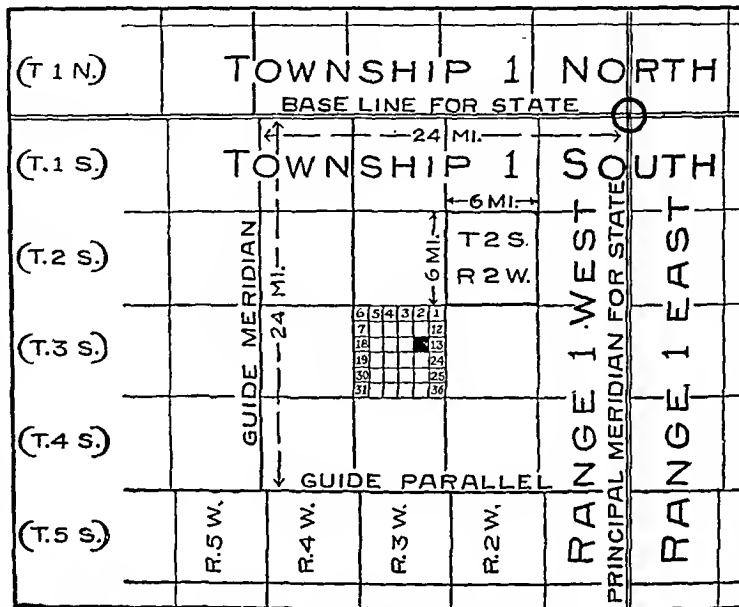
By 1900 practically all good farming land had passed to state or private ownership. The government still held vast tracts of desert, mineral, and timber land. Under President Theodore Roosevelt a new policy was adopted. Most of the mineral-bearing and forest lands were withdrawn from settlement, so as to conserve these resources for the public benefit (see Conservation). President Franklin D. Roosevelt issued orders in 1934 and 1935, withdrawing all public lands within the United States from private entry. This marked the end of the historic land-grant policy under which so much of the United States had been settled.

In 1944 the public domain in the United States proper amounted to 455,183,251 acres or 24 per cent of the nation's total land acreage. These lands are administered chiefly for such purposes as national forests and flood control. The secretary of the interior is empowered to lease grazing, mineral, and recreational rights and to open certain reclaimed areas particularly suited for growing crops.

Most of the public lands are administered by the Department of Agriculture and by the Bureau of Land Management of the Department of the Interior. Under the old system of surveying, the lands are

laid out into "townships" six miles square; and each of these townships is subdivided into 36 "sections," each containing one square mile, or 640 acres. The sections in turn are subdivided into quarter sections of 160 acres. Certain parallels of latitude are taken as base lines, and certain meridians of longitude as principal meridians. Townships are described as Nos. 1, 2, 3, etc., north or south of the base line, and in range one, two, three, etc., east or west of the principal meridian. A reference to the accompanying diagram will make clear this system of land description, which is used in legal documents to describe land in

HOW A PIECE OF LAND GETS ITS OFFICIAL NAME



Suppose that someone offered to sell you a 40-acre farm and described it like this: "N. E. $\frac{1}{4}$, N. W. $\frac{1}{4}$, Sec. 14, T. 3 S., R. 3 W., Ind."—would you know how to find it? This diagram will show you the secret. In the first place you must read the description backward. To begin with, "Ind." means that it's in Indiana. Now, all states have "Base Lines" and "Principal Meridians" crossing each other, from which all land locations are determined. The next part of the name "R. 3 W.," therefore, means that your land is situated in "Range 3 West" of the Principal Meridian; and the "T. 3 S.," means that it is also in "Township 3 South" of the Base Line. Where the third range strip crosses the third township strip is the "Township," which contains your farm. Now each Township is divided into 36 "Sections," each a mile square. "Sec. 14" means that your land is in the 14th Section, the one shown in black. Each section is divided in four "Quarters," and these Quarter-Sections are again subdivided into Quarters. Your farm is the Northeast Quarter (N. E. $\frac{1}{4}$) of the Northwest Quarter (N. W. $\frac{1}{4}$) of Section 14; so it's easy to find it now. Every 24 miles "Guide Parallels" and "Guide Meridians" are surveyed, and those jogs you see in the meridians where they cross the Guide Parallel are to allow for the curvature of the earth.

all states formed out of the public domain.

In Canada, the federal government administers the Yukon and the Northwest Territories, totaling 1,458,784 square miles, or 42 per cent of the land surface of Canada. Other federal lands include the Arctic Archipelago, the islands in Hudson Strait, Hudson Bay and James Bay, the national parks and historic sites, Indian reserves, forest experiment stations, experimental farms, and ordnance and admiralty lands. In general, the holdings include all lands connected with the administration of the federal government.

Other public lands in all provinces are under control of the provincial legislatures. Requirements for obtaining such lands vary among the provinces. A common requirement for obtaining agricultural land is residence for three years and payment of a small purchase price. Land bearing valuable timber usually is leased rather than sold. About 37,000 square miles are in provincial parks.

Grants of title to land held by homesteaders are sometimes called land patents, because they make public the granting of the title by the government.

LANDSEER, SIR EDWIN HENRY (1802-1873). "Where is my curly-headed dog boy?" the teacher of the Royal Academy school used to ask, when he missed the lad Landseer from his classes. The answer would be "At the Zoo," for this boy divided his time between the two places, and at either was sure to be found studying animals or making pictures of them. Dogs were his favorites, and his first drawing to be engraved and published was of a great St. Bernard. 'Fighting Dogs Getting Wind', was the first of his paintings to bring him fame. His London studio was full of paintings of dogs, big and little, fierce and kind—all so real that visitors would stop at the door and call out, "Landseer, keep your dogs off."

Although he was especially fond of dogs, Landseer loved all animals. Once in Scotland he was taken deer-hunting, and as he and his host lay in ambush a splendid stag appeared. While the host in courtesy waited for Landseer to make the shot, the artist dropped his gun and pulling a pencil

and pad from his pocket began making a sketch of the magnificent animal.

Landseer could draw rapidly and easily. A story

is told of how he once drew a stag's head with his right hand, at the same time drawing a horse's head with his left. From boyhood, when at the age of 11 years his drawings won a silver palette from the Society of Arts in London, Landseer's life story is of one success after another. He was early made a member of the Royal Academy; he enjoyed the patronage and friendship of Queen Victoria; he was knighted, and the presidency of the Royal Academy was offered to him.

Of his many dog pictures, 'The Old Shepherd's Chief Mourner' is perhaps the best known. His stags are quite as popular as his dogs, and of these the 'Monarch of the Glen' is a favorite. Besides his pictures of animals Landseer painted many portraits also.

His celebrated sculp-

tures of the great lions that stand in Trafalgar Square, London, show equal mastery in this field.

AS LANDSEER SAW HIMSELF



The famed artist painted the original of this picture, showing himself at work with two of his fine dogs watching his labor. Sir Edwin's love for animals was equaled only by his ability to paint them.

RIGHT *and* WRONG WAYS of Using LAND

LAND USE. Anyone who has even a back yard has to think about land use. Where should the garage go; the coal chute; the clotheslines; the lawn; the rose bed; the vegetable garden? This is a miniature problem in land use that anyone can understand.

Many of us have great-grandfathers who helped to establish towns or took up farms in the Middle West. These men had to settle larger problems in land use. They did so by asking themselves three simple questions about what they proposed to do: (1) How can we do it? (2) Will it pay? and (3) Will we enjoy the result? Scientists speak of these aspects of land use as: (1) the technical or scientific; (2) the economic or business; and (3) the social or human.

In earlier days men thought that if every user of

land were free to answer these questions for himself—to do what he could, what paid him, and what he enjoyed—the problem of land use would work itself out for all of us. But after a century and a half the nation began to realize that something was wrong.

Some Good and Bad Uses of Land

Many millions of acres are not now returning a living to those who own or occupy them. A map of the lands on which taxes have not been paid for a long time will show this; so will a map of relief payments to farmers. These maps would not differ much from the map on the following page showing regions where people are trying to farm land that is better suited to other uses. From this map we can see that the wrong use of land is most marked in three regions. These are

- (1) the southeastern states, (2) the Great Plains, and (3) northern Michigan and Wisconsin.

The southeastern region has many good farming districts, such as the beautiful Shenandoah Valley of Virginia; but much of the land is too rough and thinly covered with soil to make good farms. This land was once covered with fine forests, and it ought to be put back to growing trees. The country needs lumber, and the forests would check floods (*see Floods*).

In the Great Plains, where the average rainfall is less than 20 inches a year, most of the land is best suited to cattle grazing. But in many places the ground has been plowed for dry farming. Now, skilful dry farming can be made to pay; but it is a dangerous gamble. If the wrong kind of soil is plowed in the wrong way, it will start to blow and then we have dust storms, drifts, and general destruction. Dry years will produce crop failures. A farmer must have money enough to carry himself over when this happens. Many dry farmers do not. Much of the land they have plowed ought to be put back into grass.

The bad spots in Wisconsin and Michigan are cut-over pine forests; this land cannot be farmed profitably.

Our map also has some bright spots, where the land is properly used. The land of eastern Pennsylvania is rich, and was settled in Colonial days by skilful farmers who have kept it so. Westward from central

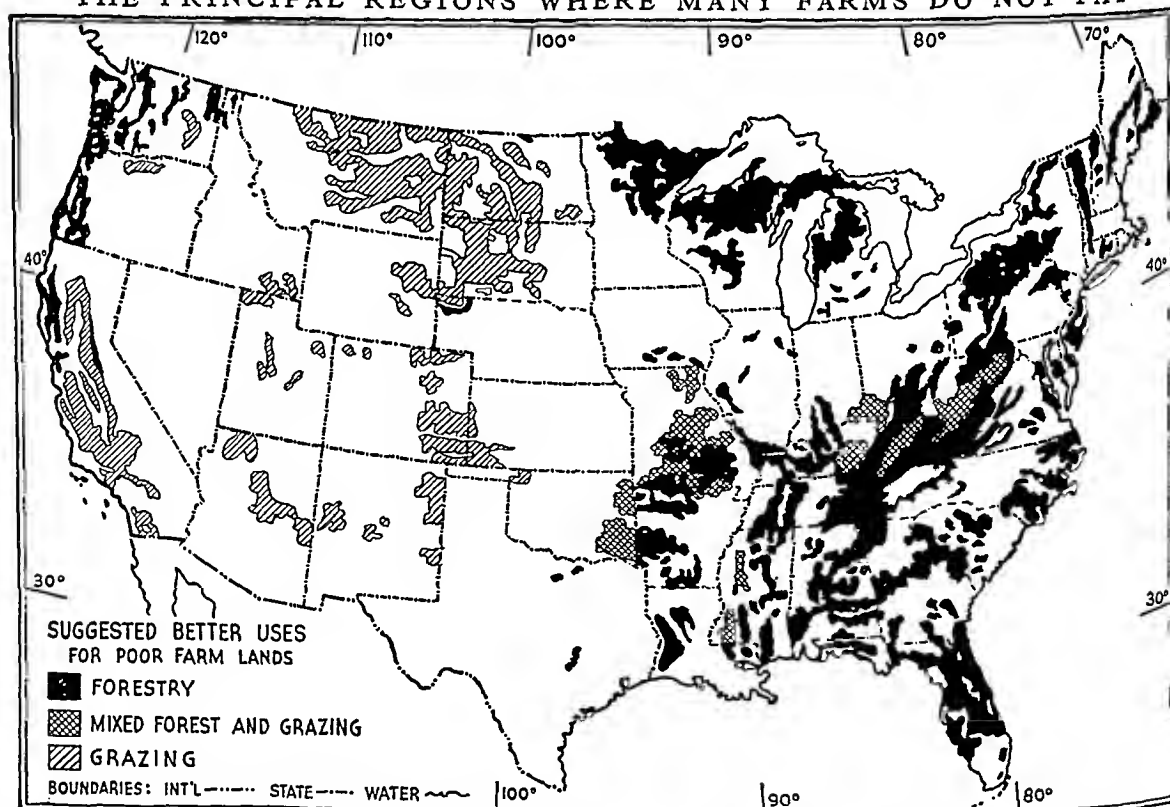
Ohio through eastern Kansas and Nebraska stretches a natural tall-grass prairie, which has the deepest, richest soil in the country. This region, which has in the main been wisely used by good farmers, has become the breadbasket of the nation. So it forms perhaps the largest "white spot" on our map. Many irrigated lands in the Far West also are very productive.

Why should we have these good and bad spots on our map of American farms? The answer lies in what happened when the country was settled.

Mistakes Made by Early Settlers

The surveyors who came west before 1800 often indicated in their notes just what use could be made of the land which they examined. But in the rush of settlement not much attention was paid to their reports, and much land was put to uses for which it was not best suited. The situation was made worse by the rapid development of transportation, which gave poor land access to markets, and tempted men to farm it. Many new inventions, also, enabled men to work land intensively, beyond its natural power to produce. For reasons such as these, much land has been exploited rather than used wisely and in moderation. The forests have been largely destroyed, and so has much of the natural grassland. Streams have been silted full of mud, floods have become steadily worse, and the underground water level has dropped greatly since

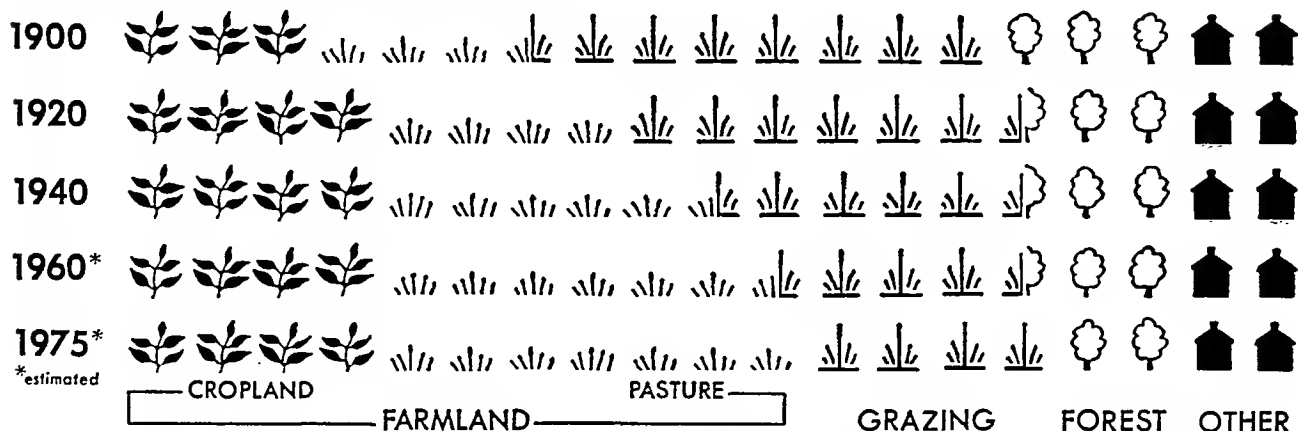
THE PRINCIPAL REGIONS WHERE MANY FARMS DO NOT PAY



The black and shaded areas show regions where a majority of farmers are unable to earn satisfactory livings, because the land is not suitable for farming. In general, the owners would do better if they used the land as indicated by the key. The map and the recommendations are adapted from a study made by the Land Planning Committee of the National Resources Board.

PAST, PRESENT, AND FUTURE USES OF UNITED STATES LAND

Each complete symbol equals 100,000,000 acres



How land is used in the nation changes over the years. Cropland and farm pasture have increased, while forests and graz-

ing land not in farms have decreased. Special use areas, such as cities, farmsteads, and roads, have remained constant.

settlement. The country's soil has suffered a loss of about 30 per cent by being washed away. All this has seriously reduced the nation's wealth in land.

Today the United States has a population of some 150 million people. To meet their needs, the continental United States has a land area of almost 3 million square miles, or about 1,900 million acres. The people have put land to different uses, as shown on the graph above. Land uses may be classified in various ways because a single acre may be used either for crops, pasture, grazing, or forest, or combinations of these. The graph follows a classification of the United States Department of Agriculture.

Land Uses in Past, Present, and Future

The graph shows how an increasing number of acres have been used for crops and pasture during the first half of the century. On the other hand, the number of acres in forest and nonfarm grazing land has declined. Other uses have been stable in acreage.

About 55 per cent of all land is now in farms, either as cropland or pasture. Only about 20 per cent of this, however, is used for growing crops. Forests and grazing land not in farms together account for about 35 per cent. The remainder, approximately 10 per cent, is occupied by cities, farmsteads, roads, railroads, desert, swamps, and dunes.

By 1975 the population of the United States should be about 193 million according to studies of birth and death rates. To feed this increased population, only slightly more cropland will be needed. Some undeveloped land can be made productive by irrigation, drainage, or clearing. Some pasture can also be rotated with crops. A large amount of misused cropland, however, should be converted to pasture or woodland.

Only a small additional amount of cropland will be required because the yield per acre will be increased by better conservation farming and by technological progress, such as improved farm machinery, seed, livestock, and disease and insect control (see Conservation). A greater food supply could also result from a reduction in the export of farm products or an increase in the import of such products.

The country will also need more wood for its larger population. To meet this demand, some poor farmland can be reforested. Timber supply, however, is as much a matter of land management as of land use. If the existing forests were properly managed, they could probably supply all needs (see Forests).

Special uses will also require some additional land. As more people move into cities or leave the cities for suburban homes, they will need more room for living and recreation. Roads and railroads will occupy more space as they are extended.

How Culture Affects Land Use

In planning how to make these readjustments, planners must consider what people will be wanting to do with land 20 or even 50 years from now. For in the end, the pattern of human activity, or culture pattern, largely determines how land will be used.

If a tribe lives by hunting or gathering wild food, ten square miles may be needed to support it, and the plants and animals must be kept in nearly their natural state. This was true of the Sioux Indians. If a group, however, should live by intensive cultivation of irrigated land, one square mile might support hundreds of people, as in Egypt and China. Or a few farmers working a large area might provide food for hundreds of people in cities. So too, a small land rich in minerals might support hundreds of people, if they get their food elsewhere. All such possibilities must be considered in planning for land use.

Choosing and Using Farm Land Wisely

The capacity of land to produce depends upon what is in it. This is clear enough if we are talking about minerals. It is also true, however, for crops. We cannot profitably grow food in the wrong type of soil.

The kind of soil depends somewhat upon the kind of rock from which it was formed. Thus the Atlantic coastal plain is excellent for market gardening because it is sandy, having only recently been sea bottom. It requires much fertilizer, however. Kentucky and Kansas, whose land is sweet because it is underlain by limestone, are remarkable for their pastures. Capacity to produce depends also upon climate, for

climate determines the amount of water, the vegetation, the soil structure, and even to some extent the mineral contents of the soil (*see Soil*). These factors are often difficult to weigh separately; but nature does this for us with her types of natural vegetation. Pine-forest land is likely to be acid and poor in humus; trees which shed their leaves every year usually make better soil. Tall grass is a sign of good water and rich soil; sparse bunch grass suggests that the land might best be used for grazing.

Location and Land Use

Location with reference to markets is another important factor in planning use of land. The accompanying diagram shows how location affects the use of land for farms. The expensive land near big cities is used largely for intensive farming of the more perishable and valuable truck crops. Farther away trucking gives way to dairy farming, this in turn to grain farming, and finally, on the least costly land farthest from the city, we have hay and pasture—the most extensive, least intensive, use of land.

Land values in general vary according to this pattern; and nearness to cities is often more important in determining how the land is used than is the kind of land. For example, if manufacturing or mining draws many people to a certain region and a demand for food arises, farmers can afford to work naturally poor land near by, using fertilizers and perhaps irrigation. On the other hand, naturally good land may hardly be worth farming, because of its location. The "Whiskey Rebellion" in Washington's administration was caused by the fact that farmers in the Pennsylvania hills could not afford to haul their grain to market as grain. Only by changing it to whiskey could they make money; and they therefore resisted the new whiskey tax.

Agencies Interested in Planning

Since 1900 the belief has grown that the man who owns land should not have the right to destroy its value for the future. Instead he should look upon himself as a trustee, charged to pass the land on in as good condition as it came to him. Back of the owner's rights lie the rights of all the people. Freedom should mean freedom to use and enjoy, not to wreck.

Since the United States is a democracy, land-use problems cannot be settled by force. What means do we have to make possible a national program?

1. *National Planning.* Several government agencies and departments are assisting by collecting information and promoting local efforts. The Agricultural Adjustment measures were designed to encourage proper land use. The Department of the Interior has

withdrawn all public lands from private entry (*see Lands, Public*). The Taylor Grazing Act permits this department to regulate grazing on public land. A model state conservation law drafted by the Department of Agriculture provides a democratic method whereby local districts may adopt land-use regulations, with expert help.

2. *State Planning.* Each state, through a planning board, can cooperate with federal efforts. Wisconsin and Michigan have taken great steps forward in the problem of land use. Many counties in Wisconsin have adopted county zoning plans, which indicate the proper use of land in each county.

3. *Regional Planning.* The states can be divided into a number of more or less natural geographical groups. These groups correspond roughly to groupings used by the national government in handling soil conservation, forestry, and related work. States within these regions can form agreements to cooperate.

4. *Education.* This is the most hopeful means of bringing about wise land use. The United States Commissioner of Education has sponsored public discussion forums and has developed material on land use and conservation for schools. A flood of books and magazine articles is rousing popular interest.

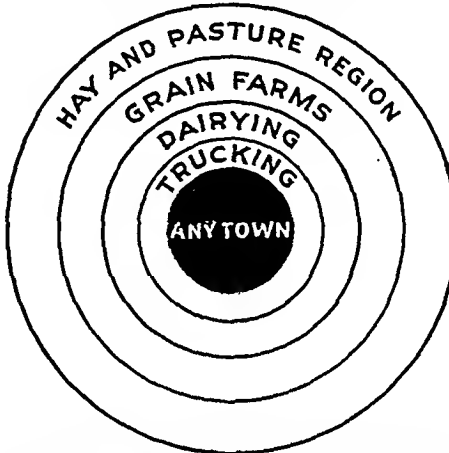
American and Foreign Land Use Planning

After lagging behind Europe for years, the United States now leads the world in land use planning and soil conservation work. Since 1937, more than 80 per cent of the nation's farms have been enrolled in voluntary conservation programs. With the technical aid of the Soil Conservation Service, farmers treat gulched and worn lands to stop erosion and to determine the best use for each acre.

Representatives of many nations have studied conservation methods on United States farms; and American experts have aided projects in other lands—notably in Latin American countries.

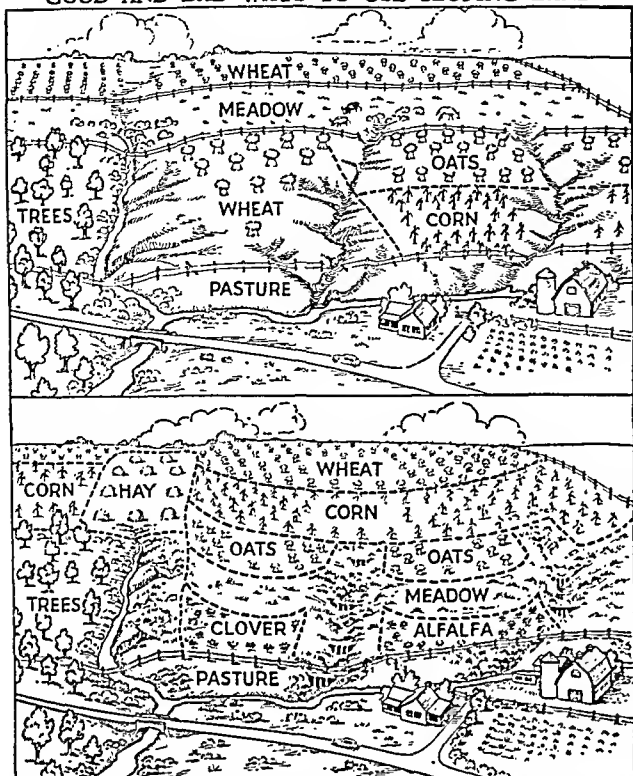
Before the second World War, Mussolini set in motion a huge drainage project to fit the Pontine marshes near Rome for intensive farming. The Russian government laid extensive plans for the use of each part of its vast land. Some signs suggest that Russia may have repeated some of the mistakes Americans have made, particularly in practising dry farming too widely. The British Empire had also set up projects in many areas. Huge dams and storage basins in India reclaimed thousands of desert acres. In parts of Africa, reclamation efforts came too late. Some tribes had so increased in numbers under British protection that they had overworked their land until soil erosion caused widespread damage.

CITIES AND FARMS



From any great city, the use of farm land tends to change with distance, as the chart shows. (After a diagram by Dr. A. E. Waller.)

GOOD AND BAD WAYS TO USE SLOPING LAND



Proper land use can preserve farms by stopping erosion. Top, a farm was being eroded because the land had been cultivated regardless of slope. Bottom, rearrangement of fields and cultivation along contours, or level lines, are saving the soil.

In a changing world, present conditions and methods may need revision. For example, will decentralization of industry demand more land near rural factories so employees can earn part of their living by farming? Will trailer homes reduce the amount of land needed for lawns and houses?

Inventions may affect land use. Acreage in crops would be reduced if *hydroponics* or *tray agriculture*, could grow crops on a commercial scale (see *Plant Life*). The development of synthetic fibers, such as nylon, may diminish the amount of land needed for cotton and sheep raising. The invention of synthetic human food may also release farming land.

The nation is steadily consuming its mineral fuels—coal and oil. In time, fuel scarcity may cause a popu-

lation shift south to the fertile Mississippi Valley. Or men may learn to use another force, such as atomic energy, for heating and power.

LANGLEY, SAMUEL PIERPONT (1834–1906). On May 6, 1896, a strange winged machine flew a half mile over the Potomac River near Washington. The odd craft was about 16 feet long and weighed some 26 pounds. It flew about a minute and a half. This was the first time a power-driven, heavier-than-air machine stayed in the air more than just a few seconds.

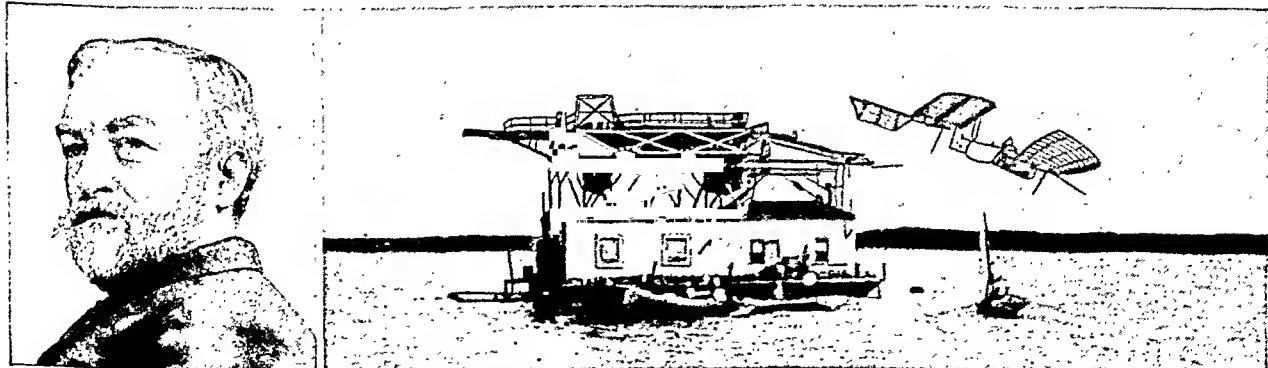
The builder of this airplane model was Samuel P. Langley, secretary of Smithsonian Institution. After many laboratory experiments he had finally shown that mechanical flight was possible. Later, for the War Department, he built a 56-foot machine. Two attempts in 1903 to launch it failed. But the Wright brothers proved the worth of Langley's ideas in their successful airplane (see *Airplane*; *Wright*).

Langley's interest in aeronautics began as a boy in Roxbury, Mass., where he was born. He watched gulls wheel and soar, using their wings only to meet new currents of wind. His father's telescope gave him his first knowledge of astronomy. He attended Boston Latin School, but did not go to college.

After seven years with a Chicago engineering firm, Langley held positions with the astronomical observatories of Harvard University and the United States Naval Academy. In 1870 he became director of the Allegheny Observatory at Western University in Pittsburgh, Pa. He helped raise money for the observatory by selling the first standard time service to the Pennsylvania Railroad. Time signals were flashed to all stations on the road for engineers to set their watches. In 1878 he invented the bolometer, a sensitive electric thermometer for measuring the distribution of heat in the energy rays of the sun.

Langley was appointed secretary of the Smithsonian Institution in 1887. He made the exhibits interesting for people of ordinary education and ordered the institution's books to be written in simple language. He established the famous Children's Room and put into it the things children liked—stuffed birds with their nests and eggs, odd sea animals, bright shells, and coral formations. He collected animals for a zoo, and from this grew the National Zoological Park.

A FAMOUS INVENTOR AND HIS FLYING MACHINE



At left is Samuel P. Langley, experimenter in aeronautics. At right is his aerodrome patterned on his successful steam model. The aerodrome failed to fly and was dubbed "Langley's folly." But in 1913 Glenn Curtiss installed a stronger engine and flew it.

MAN'S RECORD in LANGUAGES and LITERATURE

LANGUAGE AND LITERATURE. Animals signal by a variety of sounds, and some birds even "talk" a little. These sounds are forms of communication, but they are not *language*. Only people can make and use language, because language is the *system of words* that we use to tell our ideas to one another.

These systems differ throughout the world. The words vary from language to language, and so does the grammar, or way of putting words together to express ideas. Every known people speaks some kind of language. Some languages are spoken by only a few score people or less; others, by many millions.

No language is a natural gift. Each has to be learned. That learning begins in babyhood, and it is one of the greatest feats achieved by the baby. His first sounds are mere cries or babblings, but gradually he learns from his parents or others to form sounds into words (*see Voice*).

To say words, he must learn to associate *certain sounds with certain meanings*, such as objects or actions or ideas. His parents help by holding, for example, a toy dog out to him and repeating, "Dog, dog." The parents then work to enlarge the child's *vocabulary*, or stock of words. The child then must learn to put the words together in orderly fashion to make a sentence, which expresses a complete thought (*see Grammar; Sentence*). Sentence structure, or *syntax*, differs in nearly every language.

A country's native language is called *national language*, or *mother tongue*. In fact, the word language comes from the Latin *lingua*, "tongue." People who speak the same language make up a *language community*. These communities are not limited by national boundaries. For example, the people of the United States and Britain represent two separate nations, but the national language of both is English and so they form a language community. So too do the French residents of Indo-China in Asia form a language community with the people of France in Europe.

The most *widespread* language community is English. It reaches into every corner of the world and is the native tongue of over 200 million people—more than 10 per cent of the world's population. More than twice as many people, about 460 million, speak Chinese. Some 250 million speak Hindustani and its allied tongues. Russian is the language of over 190 million. Spanish, Japanese, and German are each spoken by over 100 million; French by over 70 million; Portuguese, Italian, and Bengali each by over 50 million people. Yet these great groups represent only a few of all the tongues, because there are more than 1,000 language communities in the world.

Discoveries in Language

The study of language is called *philology*, from Greek terms meaning "love of speech." Scholars in ancient China and India compiled studies of their own languages. But not until the 18th century did Europeans begin systematic work in comparing languages. The leading philologists included Sir William

Jones of England and Franz Bopp and Jakob Grimm of Germany (*see Grimm*).

The interest of the philologists centered in the Indo-European languages. The chief ones of this group are shown in the "language tree" in this article. They were once popularly called Aryan, and the people who speak them were thought to be a single "Aryan race." This idea has been discredited.

The philologists discovered that Sanskrit, a dead language of India, was related to Greek and Latin and the Germanic languages, of which English is a part. From this start they found that most European languages and some in Asia grew from a common tongue.

They now believe that the original Indo-European tongue arose in the grasslands of Asia. Gradually people migrated to east and west. As they moved farther apart, differences arose in the speech of the groups. At first they could understand one another, just as a man from Boston can understand another from New Orleans, even though they pronounce many words a little differently. But gradually the differences became too great for mutual understanding.

But the *etymology*, or "root," of many words is similar in several languages and so must have begun in a mother language. For example, the English word "mother" is *mutter* in German, *mater* in Latin, *meter* in Greek, *matar* in old Persian, *macar* in the Tocharian or Central Asia, and *mata* in Sanskrit.

Other Families of Language

The Indo-European language family has received the most study, but there are other important language families. The principal groups are the *Sino-Tibetan* family, which includes Chinese and Tibetan; the *Dravidian* group of Ceylon and the Indian peninsula; the *Japanese-Korean*; the *African Negro*; the *Malayo-Polynesian*; the *Semitic* and related groups, including Hebrew, Arabic, and Coptic; the *Ural-Altaic*, including Finnish and Hungarian; and the *American Indian* languages.

The Three Types of Languages

Indo-European languages are *inflected*, from the Latin word meaning "turn"; that is, they use a system of grammar which changes the form of a word to show person, gender, tense, case, and so on. Such changes are usually added to the stem of the word.

A second type of language is the *agglutinative*, from the Latin term meaning "to glue." In place of inflections, the agglutinative adds prefixes, infixes, and suffixes to the root word. The agglutinative type includes Turkish, Mongolian, and several American Indian tongues. The third type is *isolating*, from the Italian word meaning "island." Here each word stands for a root idea. It is a monosyllable, with no additions. Grammatical relationships appear only through the place of the word in the sentence. Chinese is the chief tongue in the isolating group.

Language in Writing and Speaking

In every country that has education there are spoken and written usages of language. The written

language tends toward formality, imagery, and cadence (*see* Writing). It employs about double the number of words in the spoken vocabulary (*see* Spelling). The spoken language, except for public addresses, leans toward informality.

Nearly every spoken language has a *standard* and a *substandard*. The standard is set by rules of grammar. For example, "He doesn't have any." The substandard seems rooted largely in carelessness or ignorance. The substandard of "He don't have none" usually carries some social stigma.

Language Is Always Changing

Language is not static. Words constantly change, though we are seldom aware of it. To meet new situations, we invent new words such as *radar* and *television*. Meanwhile old words are dying. In Shakespeare's day, *frampold* was widely used to mean "peevish." Today it is forgotten by all but scholars. Words are also getting new meanings and dropping old ones. The word *imp* used to mean "scion." An old epitaph begins, "Here lies that noble imp." Such shifts in meaning are called *semantic* changes. This has led to a study called *semantics*, which seeks true meanings. For example, "soon" at one time meant

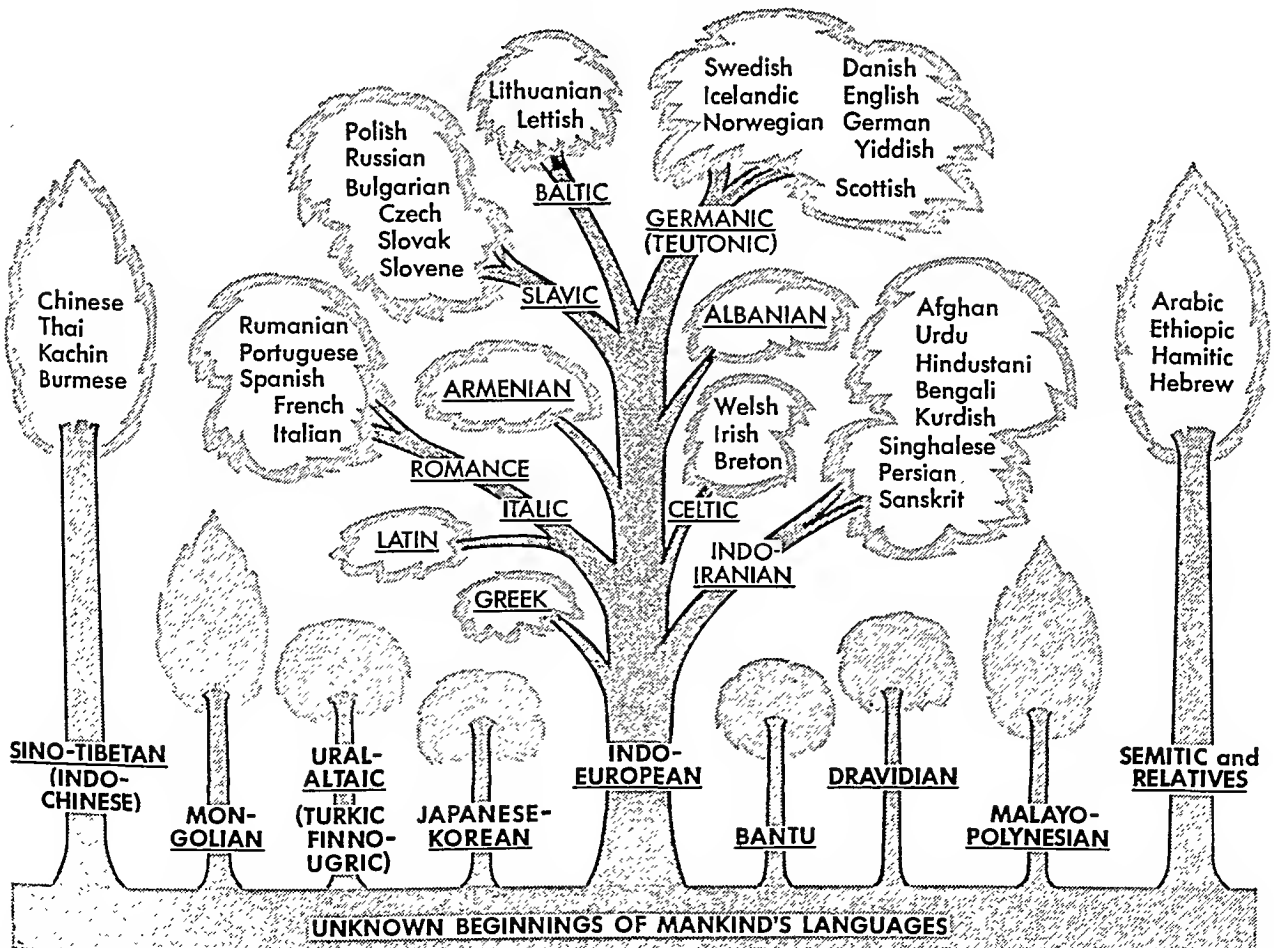
"at once." Now it may mean anything from five minutes to a week or more. In semantics, the speaker must use words in their precise meaning. Semantics is especially valuable for analyzing propaganda (*see* Communication).

Words change also in sound (*phonology*) and in form (*morphology*). In English the widest phonological change took place about 1500 in what is known as the Great Vowel Shift. For some reason, the long vowels changed in value. Only a century before, Chaucer had pronounced the words *name*, *seem*, *ice*, and *house* as "nahm," "same," "ees," and "hoose." In the Great Vowel Shift, the vowels took the value we give them today.

Morphological change accompanies phonological change. Endings especially drop from words, and so simplify the form. But sometimes endings are added to gain an economy in words. For example, *gentlemanly* replaces "like a gentleman." Both phonological and morphological changes create *dialect*, from the Latin word meaning "converse." Dialect is the local "twist" given to language.

Complexities of language have led to efforts to form *artificial* languages that could be understood by many

GREAT LANGUAGE FAMILIES THROUGHOUT THE WORLD



Language is so old that no one knows how or when it began. Here we see the principal language families of the world. The Indo-European "language tree" dominates this drawing, because it is the family most studied. Notice how the Romance languages branch from Italic, and English from Germanic. But few languages are "pure," because many borrow words from each other.

peoples. European traders in the Mediterranean, for example, developed *lingua franca*—a mixture of Italian, French, Spanish, Greek, and Arabic. In the Orient, traders used *pidgin English*, mixing English and Chinese. Late in the 19th century *Volapük* and *Esperanto* appeared (see *Esperanto*). In 1930 an experiment by C. K. Ogden resulted in *Basic English*.

How Did Language Begin?

Language is as much a part of our living as breathing and eating, yet no one knows when it began. It started long before writing, which philologists say began about 3100 B.C. Some philologists think language grew from people imitating animal sounds and that gradually the babble was used to convey an idea. We only know that primitive languages are a complicated stringing together of sounds. For example, a savage may say, "hunting-in-the-morning-with-friends-for-a-bull-elk." He does not sort out key thoughts such as *hunting* or *when* or for *what*. But as civilization developed, people simplified their language to specify objects and ideas. As language grows older, it gets simpler. One of the oldest languages is Chinese. Some philologists think that this isolating type may be the simple language of the future.

How Literature Began

Literature probably came into being not very long after men first learned to communicate with each other. At first they had only the words needed in their primitive family and community life, but as they progressed in language skills and added words, they began to exchange thoughts and ideas as well. With this ability to communicate something more than everyday facts, literature was born.

All this took place thousands of years before men learned to write. Their literature was oral, passed from person to person and down through generations by word of mouth. These early men were capable of deep thought and emotion, but they did not express themselves in abstract terms. When they speculated about the movement of the sun, for example, they made up stories to explain it—stories in which gods with human qualities were the chief figures. Because hunting and war were part of their daily lives, primitive men admired physical courage; and many of their stories were of heroes (see *Mythology*).

The Forms and Themes of Poetry

The sense of rhythm is almost innate in most people; and dance and song are universally enjoyed. Before stories were written, early men found they could recite their tales of gods and heroes more effectively (and memorize them more easily), if their sentences fell into rhythmic lines. They chanted their stories, often with drum-beat accompaniment, arranging the important words in the lines so that the accents, or stresses, fell in a regular pattern (meter) on these key words. In this way, the oldest of all literary forms, narrative poetry, came into being. Such great narrative poems as the 'Odyssey' and the 'Iliad', 'Beowulf', and the Scandinavian 'Eddas' were passed from teller to teller through the centuries before they were finally recorded (see *Odysseus*; *Beowulf*).

The longer and more heroic narrative poems are called *epic* poems. John Milton's 'Paradise Lost' is generally considered to be the greatest English epic poem (see *Milton*). An interesting modern example is 'John Brown's Body' by Stephen Vincent Benét.

Among the shorter narrative forms is the *ballad*, which can be recited or sung. A ballad is a kind of short story in verse; many of the best ones were composed by minstrels and folk singers long ago. Two famous ones are the old Scottish ballad 'Sir Patrick Spens' and the American 'Casey Jones'.

Lyric poetry includes the nonnarrative forms. The sonnet, ode, elegy, and song are forms that poets use to express brief, sustained statements of emotion about nature, love, death, or any of the things about which human beings feel deeply.

Poetry is usually defined as a rhythmic, often rhymed, composition with carefully selected words, while prose is the ordinary language of speech and writing. Actually there is a great overlapping between prose and poetry. In many examples of great writing, the so-called prose might just as well be arranged in lines resembling poetry. In the 'Modern Reader's Bible' this has actually been done; and such sections as the Book of Job can be seen—and read—as poetry. In this book, as in other true poems, there is a highly emotional content, with words and meter chosen to present this content most effectively.

The terms "poem" and "verse" are not synonymous, even though each may use the same forms and deal with the same subjects. A greeting card sentiment, eight lines long, is verse; A. E. Housman's 'With Rue My Heart Is Laden', also eight lines long, is poetry. The difference lies in the details of handling—in the emotional depth of probing, in the imaginative and careful choice of language, and in the subtlety of the rhythms. (See also *Poetry*.)

Novels and Short Stories

The tales of gods and heroes that men so admired in ancient days have given way to stories with more "human" interest. Formerly people wanted to hear about characters greater than themselves; now they want to hear—and read—about people more like themselves. This tendency was foreshadowed as early as the 'Odyssey'. Odysseus had no superhuman qualities. He got into difficulties because of his human weaknesses, and he got out of them by applying common sense and a practical, problem-solving ability. The 'Odyssey' may be read as a series of short stories in verse, resembling, for example, James Michener's 'Tales of the South Pacific' in prose.

Modern prose fiction, long or short, deals with human beings involved in a believable train of events. It explores human emotions and gives the reader insights into human personality and character. It resembles real life, but it provides a selection and a unity that is not apparent in the real world about us.

Novels take many forms, ranging from the short, fast-moving detective tales, such as A. Conan Doyle's 'Study in Scarlet' to long, slow analyses of the inner life, such as Marcel Proust's 'Remembrance of

Things Past'. They may draw their materials from history, as Leo Tolstoy's 'War and Peace' does; or they can be based on the daily life of ordinary people, as is Jane Austen's 'Emma'. They may strive for almost photographic realism, as in Arnold Bennett's 'Old Wives' Tale'; or they may create a fanciful, humorous world, as in Anatole France's 'Penguin Island'.

Whatever its theme, a story is usually worth reading if it shows a growth and change in its central character. In seeing how and why the personalities of the characters are altered by events, the reader comes to understand better the same changes in himself and those about him. (*See also Novel.*)

Drama and the Stage

A poem or a story is the work of a single author. A play, as seen on the stage, in the movies, or on television, is the product of the work of many people. The playwright creates the written (or printed) version; but this is only the first step. The scenery and costume designers help set the mood; a composer may write theme music; the actors offer their own interpretation of the characters; and the director welds the whole production into unity. Even the audience, by its response (or lack of it), contributes to the final effect of a stage play.

In one sense, a play is the most realistic of all forms of literature, for flesh and blood people act out a story and give it lifelike dimensions. Yet the dramatist is limited by many conventions from making his story truly lifelike. A play, with rare exceptions, must be staged in three hours or less, whatever the time span of the story may be. The play can include only the most significant events and must use transitional devices to indicate what takes place in the intervening time. It can show relatively little physical action and only a few scenes.

A motion picture shown in a theater or on television is also limited by time; but it can show much more physical action and many scenes. However, even three-dimensional movies and large-screen television lack the "live" quality of the "legitimate" theater, and the vital sense of audience response is not present to heighten the actors' performances.

Plays may be in unrhymed (blank) verse, as were most serious plays until the 18th century, or they may be in prose, as virtually all plays are today. A few modern verse plays, such as T. S. Eliot's 'The Cocktail Party' and Christopher Fry's 'The Lady's Not for Burning', have been successful. Old or new, plays are built on the conflict of human personality.

They begin in the midst of some action which permits a revealing look at the principal characters and which suggests the source of the conflict that has already begun. Through action and dialogue the conflict is intensified until a climax is reached. It is finally resolved at the end, happily or tragically, by showing that a state of balance now exists between those people whose natures were at war.

Dramatists, like novelists, can draw their events and characters from history as Shakespeare did in 'Julius Caesar' and Maxwell Anderson did in 'Anne of the Thousand Days'. They may go to domestic life for their materials, as Henrik Ibsen did in 'A Doll's House'; or they may create a wholly imagined world, as James M. Barrie did in 'Peter Pan'.

Familiar and Formal Essays

The art of the familiar, or informal, essay, as originated by Michel de Montaigne and brought to a high degree of literary excellence by Charles Lamb and William Hazlitt, is little practiced today. These masters of the essay chose such subjects as 'Old China' or 'On Walking', but what they wrote about was themselves. Thus what the reader gains is not information about china, or hiking, but an enjoyable glimpse of an interesting personality.

The formal essay is a closely reasoned objective piece of descriptive, expository, or argumentative writing. The subjects may be taken from any one of the many fields of knowledge, but they are intended for the general reader. From well-written formal essays the reader gains factual knowledge; he also derives real reading pleasure in observing how skillfully the material is presented. Thomas H. Huxley on science, John Ruskin on art, and Matthew Arnold on literature were essayists who presented facts and ideas with great literary skill. (*See also Essay.*)

Other Forms of Literature

Histories, biographies, diaries, and even letters become literature when their authors make events and people come alive. When the craft of writing is allied with a deep understanding of personality and emotion, the result is literature, no matter in what form it appears.

Thus we read Edward Gibbon's 'Decline and Fall of the Roman Empire', James Boswell's 'Samuel Johnson', Samuel Pepys's diary, and Jane Welsh Carlyle's letters not so much for historical or biographical fact as for understanding human personality—the personalities of the people portrayed and that of the author himself. (*See also Diary; Letter Writing.*)

REFERENCE-OUTLINE FOR STUDY OF LANGUAGE AND LITERATURE

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LEARNING Our LANGUAGE by USING IT

LANGUAGE ARTS. When the language arts program was introduced into the school curriculum no new subject was added and none subtracted from it. The field of study covers only the old familiar subjects—reading, spelling, handwriting, and composition. The term does, however, imply a changed approach to these subjects and to a different way of teaching them.

These differences are the result of a great deal that has been discovered of the ways children learn best. Through numerous surveys and studies educators found that children learn best when they use what they learn and when they learn by associating ideas that belong together. It is in the direction of this principle that the theory of the language arts is pointed, and the theory affects the teaching.

Schools have always taught handwriting, or penmanship. For many generations it was taught as a single skill and apparently for its own sake. Then educators began to ask questions such as these: How well should a person write? What is the purpose of teaching handwriting? How well does the typical adult write? At what speed should a pupil be required to write? To what extent are problems of beginning reading associated with problems of handwriting? Can the methods employed in teaching handwriting contribute to the development of reading skill or ability?

The first question had been answered in practice very simply. Every child should be taught to write as well as he possibly could. To that end hours were spent on drill. At first this drill was devoted to

reproducing copybook specimens. Then exercises, involving not words or letters but ovals, circles, and other figures, were employed in order that muscular control might be developed. Little of this had to do with putting thought on paper for someone else to read. It was years before school people thought of handwriting as a means of communication rather than as a skill.

The approach began to change about 1915, following considerable research. Investigations were conducted to determine how well a typical sixth-grade child or an adult actually wrote. The assumption was that children should be taught to write well enough to meet their normal social needs. Photographic studies of the movements of good and poor writers shed light on methods of teaching handwriting.

Writing as Part of Language Arts

As a result of the studies a new attitude became apparent. The reasonable question was asked: Why should a child be taught to write before his muscular control is adequate or before he has something to say? Most of the writing exercise came to be directed toward writing words. Efforts were made to have these words convey the children's own thoughts. At the same time attention was paid to the spelling of the words and to the sounds of the letters. Handwriting thus became a part of the language arts.

The relation between handwriting and reading was examined. When attention is paid to the meaning of words and to the sounds of letters in them, obviously reading is being taught. The difference between the

form of letters as written in script, or cursive writing, and the shape of those same letters in print is, however, considerable. For example, consider the script and the printed form of z, l, n, and y. The contrast is even greater between the forms of capital letters. Educators began to recommend that children be taught to write a print script, or "manuscript" alphabet. They would have to learn only one letter form, and no major problem would be involved in making a transition from the written word to the printed word. Teachers had long been accustomed to printing on the blackboard for that reason. Studies produced evidence that the use of manuscript writing made beginning reading easier.

Other reasons were advanced for advocating the manuscript form of writing for early grades. Writing requires control over the smaller muscles. This control develops slowly and younger children cannot be expected to have it in high degree. It was felt that the manuscript form was physically easier to produce than cursive, since it requires only circles, semi-circles, or straight lines.

Some parents objected to the change, saying: "They are not even teaching my child to write." Advocates of the language arts approach answered that it is the transference of thought that is important, not the shape of the marks used in writing.

Research indicated that the form of writing had but little effect on the speed of writing. Because the manuscript letters are easier to make, children wrote more and more freely. It was found that manuscript writing is more legible and also an aid in learning to read. Most schools now teach manuscript writing in the first and second grades and shift to cursive style gradually beyond that. In the upper grades, children who have acquired sufficient skill in cursive writing (and the definition of sufficient is based upon standard measurements derived from studies) do not now spend time in fruitless drill.

Teaching Spelling

Many changes in spelling have come about for similar reasons, for spelling was not taught in its relationships. It suffered from two ideas which research has completely discounted.

The first idea was that it made little difference what words were taught, provided spelling was taught in general and for considerable periods of time. The second, allied to the first, was that ability to spell was acquired partly by

LANGUAGE ARTS IN A PRIMARY GRADE



This teacher is helping first graders with their word-recognition problems as they read a story about farm life from their illustrated readers. On the blackboard is the class newspaper. The pupils gain experience in composition by dictating the news items to the teacher.

A WRITING CLASS LEARNS SPELLING TOO



As these pupils write useful words in their penmanship class, they are learning spelling too. The teacher has printed "word families" on the blackboard. They show that different words contain some of the same sounds and letters.

memory and partly by a generalized ability and that reasoning and thought did not enter into the process. The meaning of "generalized ability" is that a person by practice of any sort in spelling can build an ability to tackle any or all words. On that theory, many words might be taught directly.

People began to question the whole procedure. It was found that schools spending 75 minutes a day on spelling produced spellers no better than schools spending 20 minutes a day on it. English teachers, then as now, complained that pupils could not spell. People asked why spelling manuals contained such exotic and infrequently used words as *phthisic* (pronounced *tizik*), *dhow*, or *syzygy*. They asked for the objectives of spelling instruction. (See Spelling.)

They questioned the generalized ability theory, especially since English is not a phonetic language. If one hears an Italian, Spanish, or German word he has a fairly accurate idea of how it should be spelled. In English words, however, the same combinations of letters may produce several different sounds.

Teachers began to reach the conclusion that the only reason for teaching spelling was to enable people to write. It was agreed that spelling lessons should pay just as much attention to the meanings of the words as to the sequence of letters and that attention should also be directed toward writing them. At the same time reading should contribute to spelling.

It was demonstrated by research that development of the meaning of words facilitated ability to spell them correctly and to remember the spelling. It was found that spelling could be taught better if the words were derived largely from what children wrote and not from ready prepared lists alone.

Few Words Repeated in Typical Writing

The question of which words to teach was studied quite extensively. There are over half a million words in the English language. Obviously they cannot

all be taught directly. Studies determined which words are found most frequently in books, articles, correspondence, and other typical writing by people in different vocations and social positions.

It was startling to discover that typical writing involves many repetitions of relatively few words. Repetition of the three words most frequently used—*the*, *and*, and *to*—accounts for about 10 per cent of all the words used. Repetitions of the 100 words used most frequently account for 59 per cent; of the 1,000 words, 90 per cent; of the 1,400 words, 93.2 per cent; of the 2,000 words, 95.3 per cent; of the 3,000 words, 97.6 per cent. These figures are taken from actual tabulations. Other surveys agree in principle.

These studies indicated that if the schools teach 4,000 or even 3,000 words well they shall have taught children most of the words they will normally use. In addition, the schools aim to develop ability in

the use of the dictionary, a desire to spell correctly, and methods of approach to the spelling of a new word.

Parents can help their children with writing and spelling problems by giving them opportunities to write words they use regularly in notes, household lists, and the like. They can point out possible handwriting improvements, such as closing the circle in the cursive *a*, *d*, or *g*. They can reinforce the teacher's work by discussing the meaning of words and the common letters or sounds found in "word families." Many parents have found that beginning readers learn alphabetizing and spelling by using the guide words in their encyclopedias.

Learning the Language Through Use

Composition teaching, both written and oral, has undergone considerable change. Here too the schools have departed from an abstract approach in favor of a dynamic one. To say that one learns a language best by using the language, rather than by studying about it, seems obvious. Much foreign language instruction, however, has devoted so much time to abstractions that few American boys and girls are able to converse in a language they have studied four or five years in high school and college. This is because instructors teach about it instead of teaching it directly.

The indirect approach has been detrimental in teaching the mother tongue also. Language was formerly taught by itself. Attention was paid to diagramming, to parsing, to rules of grammar, to formal aspects of style. Teachers forgot that much of the grammar was so abstract that it was beyond the understanding of sixth-grade children. For example, it is doubtful that many adults could provide an adequate description of the use of the subjunctive in English. Yet that was once part of the sixth-grade program.

Handling Errors in Usage

By the time they have completed sixth grade, children may be expected to know simple elements of gram-

mar. They should be able to identify and recognize simple subjects and predicates. They should understand the possessive case and the parts of speech (*see Grammar; Adjective; Adverb; Conjunction; Noun; Preposition; Pronoun; Sentence; Verb*).

Children can be taught a certain amount of grammar through use. Instead of citing rules, the teacher tells them we say, "Mary went with mother and *me*," not "mother and *I*." Or "*We were*" or "*You were*," not "*We was*" or "*You was*"; and "*I saw*," not "*I seen*." Children from homes where good usage is followed need a minimum of such help. They are fortunate to have no bad speech habits to overcome.

Most common mistakes can be handled better by precepts than by rules, for the rules are quite abstract while the examples are vivid and easily applied. If the schools can correct the 30 most common errors, they will do much to improve usage.

Much formal English grammar is the result of the attempt to fit it to Latin grammar. This results in considerable artificiality. Moreover the American idiom frequently contradicts grammar. For example, "It's me," "Who is it for?" and many other technically "wrong" expressions have for decades been accepted as good idiomatic English. One can talk at length about how the verb "to be" is followed by the nominative case and how prepositions govern the objective case, but the customs of English-speaking people will prevail.

Expressing Thought in Composition

In connection with the teaching of composition the term "creative writing" is often used without being defined. To be creative, writing does not necessarily have to be new or to present uniquely original thoughts. It must, however, express the real thinking of the writer. Rearrangement of material is, in a sense, creative. Retelling a story and stating opinions about a story are also creative. Many children can be stimulated to do creative writing of an original type. Some rather beautiful poetry has been written by children who were encouraged to write instead of having been assigned a subject (*see Writing*).

Though there is no objection to assigning subjects for compositions, the language arts approach is that much of a language should be taught as it is used in a normal setting. It is held that children and adults use language best when they have a thought to convey. It is felt that the school and the home should provide occasion for pupils to write and speak their thoughts. This means that a school should not forbid but should positively encourage talking. Though teachers do not condone idle chatter, they encourage children to discuss books, projects, work, and interests. They find what children want to write about and encourage them. Thus they find occasion for writing many kinds of compositions.

Sooner or later almost everyone has to write letters of invitation, condolence, congratulation—or newsy letters. Most people have experience in writing minutes, notices, or announcements. Good schools arrange writing experiences around simple situations

PURPOSEFUL WRITING AND READING



Composition comes naturally to these small scientists. They have dictated to the teacher the things they have observed about their turtle. Now the chart is used in a reading lesson.



These science students are practicing language arts skills. They must understand "problem reading" to find the purpose of their experiment. Then they make a careful report on their findings.

such as these, as well as in book reports, stories, résumés of simple science experiments, reports of trips, and school newspaper articles. They teach handwriting, spelling, reading, principles of composition, and often much subject matter.

The science reports reflect what the children have actually done and observed. Preparing them is an excellent means of developing a kind of writing which is rarely attempted by children spontaneously. It lends itself excellently to an introduction to paragraphing, following some such outline as this: (a) What was our question? (b) What did we do or work with? (c) What did we observe? (d) What did we learn from this?

Reports of trips, book reports, and real letters all give the child opportunity to say what he thinks about things that interest him. These follow no formula or pattern. (*See Letter Writing.*)

A GRADE-SCHOOL EDITORIAL STAFF



A school newspaper is a favorite language art activity. It stimulates good work in reading, writing, spelling, and composition and utilizes information from other school subjects too.

Oral composition lessons also employ such natural media as greetings, introductions, stories, and reports. Parents assist their children by helping them to gain experiences that they will be interested in reporting. These experiences will inevitably arouse the child to want further information. Parents can help by answering questions and supplying reference books that have child-satisfying answers.

The Teaching of Reading

Reading is the remaining facet of the language arts. It is a key subject in the curriculum and is basic to all other school subjects. Since learning to read is so important to every pupil, literally thousands of studies dealing with the teaching of reading have been made in recent decades. As a result, teaching methods have changed greatly. Like the other language arts subjects, it is not now taught merely as a skill for its own sake but rather as a part of general language development.

Reading readiness has been found to be all-important to the child's success as a beginning reader. A child's readiness to read is as dependent on his home life as on his school experiences (see Reading, section "Getting Ready for Reading").

Reading instruction is typically given by means of reading textbooks. Here emphasis is placed on the analysis of words, the building of vocabularies, and the mechanics of reading. Children are taught how to recognize words by the phonics of initial and terminal sounds, by the shape of the printed word, by picture and story clues, by repeated use in the same and different situations, by spelling, writing, and countless other devices. The goal is to achieve an understanding of the meaning of words in context. As they progress through reading textbooks of increasing difficulty, the pupils gradually build up independent reading habits and skill in the various language arts. If unusual trouble with learning to read is encountered, a diagnostic and remedial reading program is started early in the child's reading experience.

The school program incorporates many types of reading. Recreational reading is stressed and books of differing degrees of difficulty provide for individual tastes and skills. The good school library, like the child's home book collection, is diversified. Some children like stories, some poetry, and some informational reading. Emphasis is placed on children's reaction to reading rather than on factual recall. Pupils enjoy telling others what they like or do not like in the books or selections read. Taste in reading is always emphasized and vivid writing praised. (See also Reading, sections "Growing up with Books" and "Reading Becomes a Personal Affair"; Libraries, section "Seven Stories High—The Child's Own Library").

Reading for Information

The schools provide special instruction in reading for information. Frequently the teacher uses topics from other school subjects and turns to text and encyclopedias for material. Emphasis is placed upon how to find material, how to get accurate, pertinent information, and how to present it to others.

The schools encourage oral reading—but not merely as an exercise in repeating words. It is done before an audience which the reader has a reason to address. The reason may be to convey information, to share or stimulate interest, or to entertain.

LANIER (*lā-nēr'*), SIDNEY (1842-1881). "Pretty much the whole life has been merely not dying," wrote Sidney Lanier near the end of his life. But his life was much more than that. While struggling constantly with tuberculosis, he became a fine poet and a musician of rare ability.



Lanier was born in Macon, Ga. As child and man he loved to play the flute and read and write verses. He graduated from college in 1860, and when the Civil War began he joined the Confederate army. After fighting in two battles he served as a scout and as a signal officer on a blockade runner. In 1864 he was captured and sent to an unhealthy Union prison. Probably then he contracted the disease which later killed him.

He married in 1867 and moved to Baltimore, Md., in 1873. There he obtained a place as a flautist in the Peabody Symphony Orchestra. Realizing that death could not be far off, he decided then to devote what remained of his life to music and poetry. He was a true master of English rhythms and the melody of English sounds, as shown by his rollicking 'Song of the Chattahoochee' and the somber 'Marshes of Glynn'. His magic is seen in such lines as these:

... the radiant marginal sandbeach within
The wide sea-marshes of Glynn;—
Beautiful glooms, soft dusks in the noonday fire

Lanier was appointed lecturer in English at Johns Hopkins University two years before his death. Holding out manfully to the last, he dictated his verses to his wife when he could no longer hold a pen.

His best-known works are: 'Tiger-Lilies: A Novel' (1867); 'Poems' (1876, 1884, 1891); 'Florida: Its Scenery, Climate, and History' (1876); 'The Boy's Froissart' (1878); 'The Science of English Verse' (1880); 'The English Novel' (1883); 'Music and Poetry' (1898).

LANSING, MICH. The present capital of Michigan, Lansing, was settled in the 1830's on densely wooded land, and the first industry was lumbering. In 1847 the state capital was moved to Lansing from Detroit; the village then consisted only of a sawmill and a log cabin. A plank road to Detroit was opened in 1852, and the first rail line reached the town in the 1870's.

Forests were cleared from the countryside and farms started. The townspeople began making horse-drawn vehicles. In the early 1900's, under the leadership of Ransom E. Olds, the manufacture of automobiles and trucks was begun. Lansing grew steadily, and today's products include cars and trucks, automotive parts, farm tools, machinery and other metal goods, and refrigerating units.

The city lies in a shallow, cuplike valley formed by the Grand and two smaller rivers. The business area and the ten-acre capitol park is set in the city's center, atop a slight elevation bordered on three sides by the river. Lansing is a trade center for a fertile farming area of south-central Michigan.

East Lansing, separately incorporated, adjoins the capital on the east. Here are Michigan State College, established in 1857 as the first American agricultural school, and the state-police headquarters.

Michigan's capitol, completed in 1879, contains the War Relic Museum. The state library has more than 500,000 volumes. In Lansing are the state museum, a state school for the blind, and a state vocational school for boys. The city has a number of fine parks, including one with a zoo.

Lansing was chartered as a city in 1859. The city owns its water and electric supply systems and a sewage-disposal plant. It has the mayor-council form of government. (See also Michigan.) Population (1950 census), 92,129.

LA PAZ (*lä pás*), **BOLIVIA.** The highest big city and government center in the world is La Paz, in Bolivia. It huddles in a deep gash cut in the lofty Andean Plateau by the La Paz River. Snow-clad peaks of the Cordillera Real on the east give it a magnificent setting. They rise to a climax in Mount Illimani's 21,024-foot crest, dwarfing the city's altitude of some 12,000 feet.

The Spanish *conquistadors* founded La Paz in 1548. The name (*Paz* is Spanish for "peace") reflects the desire at the time to encourage trade along the route between the old Inca capital at Cuzco and the Potosí silver mines. Today La Paz is Bolivia's commercial center and the hub of the land-locked country's railways, highways, and airlines (see Bolivia). It is the seat of government, though Sucre is the nominal capital.

Old and new, Indian and European mingle along the streets. Trucks stop to let a llama train pass. Broad avenues are lined with houses and buildings of Spanish and modern architecture. Steep, cobbled streets hold market stalls and shops run by Indians and *cholos*, or mixed bloods. Government buildings and the 17th-century cathedral rim the Plaza Murillo.

The city lies in the tropics, but its altitude and mountain winds give it a temperature range between 26° and 76° F. The thin air makes breathing difficult. Population (1950 census), 321,073.

LAPLACE (*lä-pläs*'), **MARQUIS DE** (1749–1827). One of the most brilliant men in the history of astronomy was Pierre Simon Laplace. With mathematics this French scientist predicted many things that men were to see later with powerful telescopes. For his great work he is called the "Newton of France."

Laplace was born in Beaumont-en-Auge, a village in Normandy. His father was poor, and Pierre could have expected only a little education at the village school. But he was handsome and courteous, as well as a good student. Wealthy neighbors took an interest in him and sent him to the University at Caen. There he made a fine record in mathematics. At 18 he went to Paris with a letter of introduction to D'Alembert, a leading mathematician. D'Alembert refused to see him, so Laplace sent him an outline of mathematical principles. This deeply impressed D'Alembert, and he helped the young man to a position as professor of mathematics at the École Militaire.

One of Laplace's first investigations was to disprove the notion that the moon would someday crash into the earth. He showed that when the moon seems to change its course, the earth is changing the path of its revolutions. From this work grew one of Laplace's great principles—that variations in the movements of planets are regular and predictable.

With Joseph Lagrange, another mathematician, Laplace reviewed the studies made since Newton's time on gravitational forces in the universe. Then he wrote 'Mécanique Céleste' ('Celestial Mechanics'), issued in five volumes from 1799 to 1825. A condensed version contained his *nebular hypothesis*, a theory of the origin of the universe (see Earth). Laplace won many awards for his studies, but he remained humble. Before his death, echoing Newton, he said, "What we know is little. What we know not is immense."

LAPLAND. National boundaries mean little to the short, stocky Lapps who roam across Arctic Europe. This region is called Lapland, but it is not a country. It includes far northern Norway, Sweden, and Finland, and a little of northwestern Russia.

The Lapps live by herding reindeer, and so they go wherever the animals can find lichens (reindeer moss) for food. In the chill, sunless winter they move south to forests near the Arctic Circle. As the long, bright summer days approach, the reindeer head for the fjords along the Arctic Ocean.

The children go to school in whatever country the family spends most of their time. They may board at the school during the winter migration, and the

THE TENT HOMES OF THE ROVING LAPPS IN THE ARCTIC



The Lapp woman at the left stews reindeer meat in a pot hung over an open fire in her tent. The baby in the center swings in his wooden cradle. When the mother travels, she carries it on her back. The squat wool tent, at the right, has a smoke hole over the cooking fire. The Lapps wear brightly-trimmed tunics, trousers, and reindeer-skin leggings. They stuff moss in their moccasins for warmth.

teacher may join her pupils at the summer camping ground. They study their own Lappish tongue and the language of the country they roam. Boys learn how to care for reindeer. Girls are taught to cook, weave, spin, knit, and sew, and to tan reindeer skin and make clothing from it.

Reindeer supply the people with most of the things they need—milk, cheese, and meat for food; skins for blankets, moccasins, leggings, and harness. They pull the canoelike sled, called a *pulka*, swiftly over the snow and frozen ground. A single family needs at least 100 reindeer, and the richest may own 1,000 to

2,000. They trade the skins for the coffee, salt, and the few manufactured items they use.

The Lapps—now numbering about 30,000 people—are thought to be a Mongoloid folk who originated in northern Siberia. They are Europe's smallest people, ranging from four and a half feet to five feet in height. Some of them have settled beside the sea and the rivers and make their living by fishing.

LARCH. This tree is peculiar among conifers in that its needlelike leaves are shed each year. There are about eight species of the larch, widely distributed through the northern hemisphere, three of these

THE LARCH TAMARACK OF NORTH AMERICA



Pictured at the left is the graceful, well-proportioned larch. In the middle we see its scaly trunk. The illustration at the right shows the short, needlelike leaves and cones of the tree.

occurring in North America. The eastern species, called the American tamarack, or hackmatack, grows in the Great Lakes and New England states, and throughout Canada east of the Rocky Mountains as far north as the Arctic Ocean. In its northern range it thrives on well-drained uplands, but in the United States it is found more commonly in swamps. It is a slender, graceful tree, about 60 feet high, with dainty threadlike needles. Longfellow mentions this larch in 'The Song of Hiawatha':

"Give me of your roots, O Tamarack!
Of your fibrous roots, O Larch Tree!
My canoe to bind together
That the water may not enter,
That the river may not wet me."
And the Larch with all its fibers,
Shivered in the air of morning,
Touched his forehead with its tassels,
Said, with one long sigh of sorrow:
"Take them all, O Hiawatha!"

The strong, tough, resinous wood of the larches is used for railroad ties, fence posts, telegraph and telephone poles, and boats.

Scientific name of the tamarack, *Larix laricina*. The western larch, *L. occidentalis*, is a much larger tree, growing to a height of from 100 to 180 feet. This and the small Alpine larch, *L. lyalli*, grow on mountain slopes in a limited area in the northwestern states and in British Columbia. The common European larch, *L. decidua*, is planted in the eastern states for ornamental purposes.

LARK. The skylark is the poet's bird. "On wings of song" he spirals upward until the heavens "melt around his flight." Then, still rapturously singing, he swings in wide circuits back to the nest on the

ground. Larks are primarily birds of the Old World. Only one species, the horned lark, is native to North America. The meadowlark, and the pipit, often called titlark, are not true larks (see Meadowlark; Titlark).

All larks wear modest coats of brown streaked with dark brown or black. The breast is buff, yellow, or white, streaked with brown or black, and the outer tail feathers are white. The horned lark has two black tufts on the top of the head, and

black patches on head, cheeks, and throat. Larks nest on the ground in open fields and prairies, where they feed on grain and insects. Their habit of walking instead of hopping distinguishes them from most ground birds. They rarely perch on trees. The beautiful music of the male is usually sung on the wing.

The larks form the family *Alaudidae*. The skylark, *Alauda arvensis*, breeds throughout the British Isles and Europe except the Mediterranean region, migrating in the winter

to northern India, Persia, and Egypt. It has been introduced, but never permanently established, in the United States. On Vancouver Island, British Columbia, however, it has become a resident. Where it is not protected by law it is a favorite cage bird and table delicacy. The horned lark, *Otocoris alpestris*, breeds in the far north of Canada and winters in central and southern United States. The 16 subspecies are widely scattered from coast to coast.

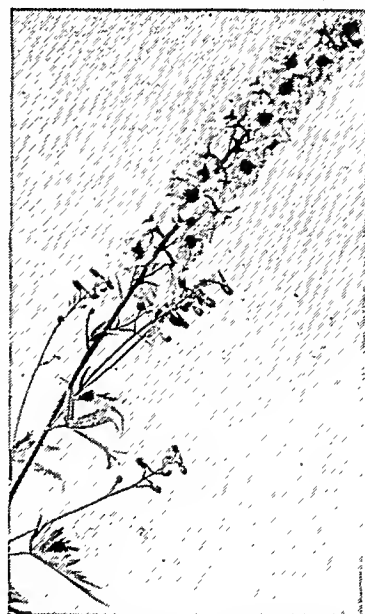
LARKSPUR. The tall blue and purple spires that border garden walls and paths in the spring are better known to gardeners by their generic name *Delphinium*. The Greeks so named the flower because they thought the elongated back sepal resembled a dolphin. This sepal also resembles the rear toe nail of a lark's foot, hence the name "larkspur." The blossoms grow compactly around a stalk from 18 inches to six feet high, which rises above low-growing, decorative leaves. Blue is the predominating color, but there are also shades of purple, white, yellow, pink, and rose. The larkspurs are annual and perennial flowers, native to cool, temperate regions north of the Equator. There are about 150 species, of which some 60 are represented in North America. They form the genus *Delphinium* of the crowfoot family, *Ranunculaceae*.

The annual larkspurs, which grow wild from coast to coast, fall into two general groups—the rocket or spike-like forms, such as *Delphinium ajacis*, and the candelabrum, with a number of short spired heads of different heights, such as *D. consolida*. These are poisonous to cattle. Native to the Mississippi Valley and eastward is the perennial *D. exaltatum*.

Most of the cultivated garden flowers are perennials derived principally from the species *D. grandiflorum*, a native of Siberia; *D. hybridum*, from Asia; *D. formosum*, possibly from Asia Minor, although the origin is doubtful; and *D. exaltatum*. The American Delphinium Society is encouraging the development of new varieties.

Delphiniums should grow in full sunshine, in deep, well-drained, but moisture-retentive soil. They are most vigorous in cool weather. Some bloom only in the spring; others become dormant in hot weather and bloom again in the fall. They are usually propagated from seed, which may be planted early in the spring, if the springs are long and cool; otherwise in late spring or early fall.

A CLUSTER OF BLUE



The buds at the bottom show plainly the spur which gives the plant its name of "larkspur."

LARK EGGS



These four eggs of the prairie horned lark are nested cosily in spite of the unseasonable snow which surrounds them.

LARVA. The word larva is applied to the young of certain animals that must undergo profound changes before they become adults. A young frog hatches from the egg as a water-living tadpole, and gradually becomes transformed into the air-breathing adult. A tadpole is therefore a larva.

Many insects go through a larval stage. This is one way of meeting the difficulty all insects have in growing. The outer covering (exoskeleton) of an adult insect is made of a tough substance (chitin) that cannot stretch or grow bigger. Many insects, like the grasshoppers, acquire such a skin when young, and must shed or molt the skin several times while they are growing. Other insects remain soft-skinned during the growing period, usually with altogether different shapes and habits from those they will have later on. Young insects in this stage are called larvae. Before they are ready for adult life, they pass through another stage, called the pupal stage, in which they get their hard outer skin (*see Pupa*). Insects that go through the four stages of egg, larva, pupa, and adult are said to have complete metamorphosis (*see Insects*).

Many insect larvae have special names. The larvae of beetles are grubs; of flies, maggots; of butterflies and moths, caterpillars.

LA SALLE, RENÉ ROBERT CAVELIER, SIEUR DE (1643-1687). Young René Cavelier, the son of a rich merchant of Rouen, France, arrived in Montreal, Canada, in 1666 to seek his fortune. When he was killed 21 years later, he was known as the *Sieur de La Salle*, the man who had explored the Mississippi River to the sea, and had given France her claim to the entire Mississippi Valley under the name of Louisiana.

For his start in Canada he got a grant of land at Lachine near Montreal from the Seminary of St. Sulpice, where his older brother was a priest. He worked this land; but he was more interested in Montreal's greatest activity, the fur trade. Every spring hundreds of Indian canoes, led by French agents called *coureurs de bois* ("wood runners"), came to trade bales of furs for trinkets, cloth, firearms, and brandy. For ten days or two weeks Montreal hummed with business and riotous celebrations; then the Indians vanished into the West until the following year.

From these Indians La Salle got the idea that sent him into the wilderness. South of the Great Lakes, the Indians said, a broad river ran southwest to "the Vermilion Sea." La Salle thought that this sea might be the Gulf of California. If so, "the great river" would be a splendid route to China, and by discovering the route La Salle could become rich.

La Salle's First Explorations

By selling his land, La Salle financed an expedition in 1669-70. He ascended the St. Lawrence River to Lake Ontario. His men paddled along the southern

shore until they came to the west end of the lake. The records of his exploration from here on were lost and historians today can not say where he went next. He may have made his way to a branch of the Ohio River and descended the Ohio as far as the rapids at Louisville and perhaps to the Mississippi.

In 1671 he may have journeyed on Lakes Erie, Huron, and Michigan. He may have portaged to the Illinois River and followed it to the Mississippi. Upon his return, he found a new governor, Count Frontenac, who thought highly of his ideas (*see Frontenac*).

A Grand Plan for an Inland Empire

In 1673 Joliet and Father Marquette had explored the Mississippi far enough to prove that the river emptied into the Gulf of Mexico. Frontenac and La Salle at once proposed to build a chain of forts and trading posts along the Great Lakes and the Mississippi to hold the region and its fur trade for France. This protection was needed because the Iroquois Indians were trying to force the fur trade through New York into the hands of their allies, the Dutch and English traders at Albany.

Frontenac had made a start on this plan by building

Fort Frontenac where the St. Lawrence flows out of Lake Ontario (*see Kingston, Ont.*). But the colony could not even maintain this little post properly; so Frontenac and La Salle worked out the idea that La Salle was to be made governor of the West, and given a monopoly of trade in the region. In return, he was to build and maintain the needed forts.

La Salle made two trips to France, in 1674 and 1677, before he got the monopoly and his title of *sieur*. Meanwhile the long-established traders and Frontenac's enemies did all they could to block him. They even poisoned his food, and they succeeded constantly in placing traitors among his men.

La Salle was ready, however, in 1678. In the winter of 1678-79 an advance party under Cadillac built a fort at the Niagara River and started to build a 40-ton ship, the *Griffon* (*Griffin*, in English). On Aug. 7, 1679, La Salle with his faithful lieutenant, Henri de Tonti, started for Green Bay on the first voyage ever made by a ship on the lakes.

They reached Green Bay in September and sent the ship back laden with furs. Then La Salle followed the route to Lake Peoria shown on the accompanying map. Here, early in 1680, La Salle built Fort Crèvecoeur ("heartbreak"), and sent Father Hennepin with two companions to explore the upper Mississippi.

Leaving Tonti in charge of the new fort, La Salle made a fast trip back to Fort Frontenac, where he found out that the *Griffon* never had been heard from. On his return westward, he learned that the Iroquois had ravaged the country. He found Fort Crèvecoeur in



SIEUR DE LA SALLE
Explorer of the Mississippi

ashes. Tonti and his men had vanished. La Salle traced him northward to Mackinac. The stout veteran had fought his way out through the Green Bay region.

Exploring the Mississippi in 1682

La Salle now spent a year organizing the Illinois Indians to resist the Iroquois; then early in 1682 he followed the Illinois River and the Mississippi to the Gulf of Mexico. On April 9 he named the entire Mississippi Valley Louisiana and claimed it for France. Retracing his steps, he built Fort St. Louis at Starved Rock, Ill., as a rallying point for the Illinois Indians.

In 1683 he returned to civilization, to find that Frontenac had been recalled and his own rights canceled by the new governor. He went to France and persuaded Louis XIV to renew his rights and to help him procure four ships and about 400 men for a post at the mouth of the Mississippi River.

The Final Disaster of 1684-87

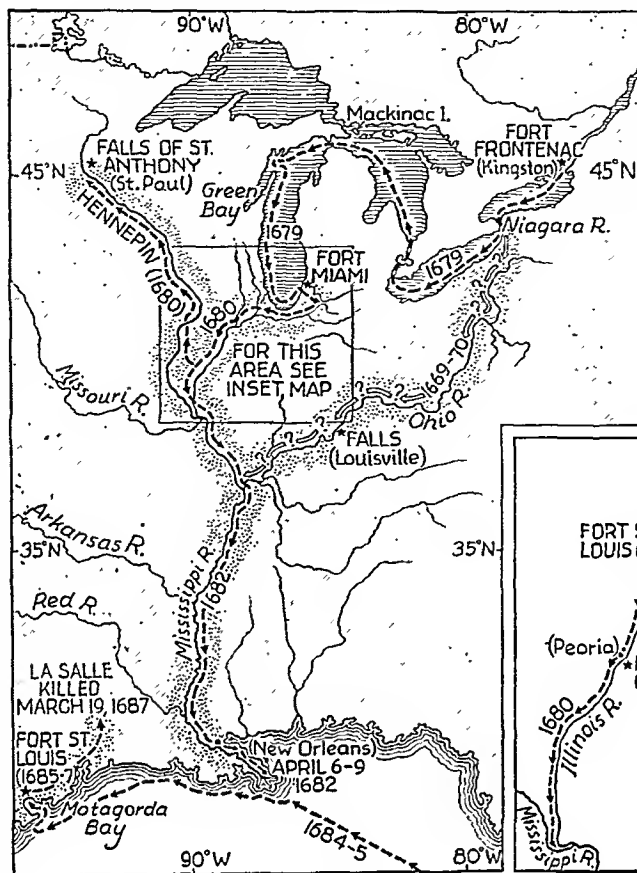
This expedition by sea ruined La Salle. The naval commander, Beaujeu, who had charge of the ships, opposed him constantly. In the West Indies La Salle fell sick. Many men deserted. When he set sail again with only about 180 men, he lost his way. He had not known how to fix the longitude of the Mississippi's mouth at the time he discovered it in 1682, and now he could not choose the right opening among the many bays and bayous. Finally he landed at Matagorda Bay, Tex., where Beaujeu left him with one small ship on Mar. 12, 1685.

La Salle started to build a fort and scouted for the Mississippi. His ship was wrecked, and his men died or were killed until he had only 36 left. Then in January 1687 he took half the men on a desperate overland trip to reach Tonti in Illinois; but on March 19 in eastern Texas, three of his men shot him.

Thus La Salle died seemingly a failure. But he had made monumental discoveries, and a few years later the French built the forts he had planned. These held the inland country for France until England took Canada in 1759 (see French and Indian War).

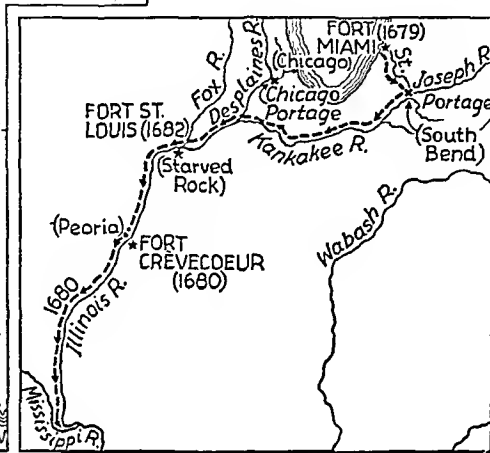
LAS CASAS, BARTOLOMÉ DE (1474-1566). As soon as the Spaniards settled in the West Indies, their need of laborers for mines and plantations led them to enslave

HOW LA SALLE EXPLORED AN INLAND EMPIRE



The large map shows how La Salle in his last 18 years explored the Mississippi Valley and tried to set up a chain of forts to control the fur trade for France. His major routes are shown, but details cannot be considered exact because no definite records of them exist. In 1671 he may have covered the same route as in 1679 as far as Chicago and then followed the Illinois River to the Mississippi.

The area of La Salle's most intensive work, along the Illinois River, is shown on the smaller map below on a larger scale. To help fix locations, modern cities nearest the sites of the forts are given in parentheses.



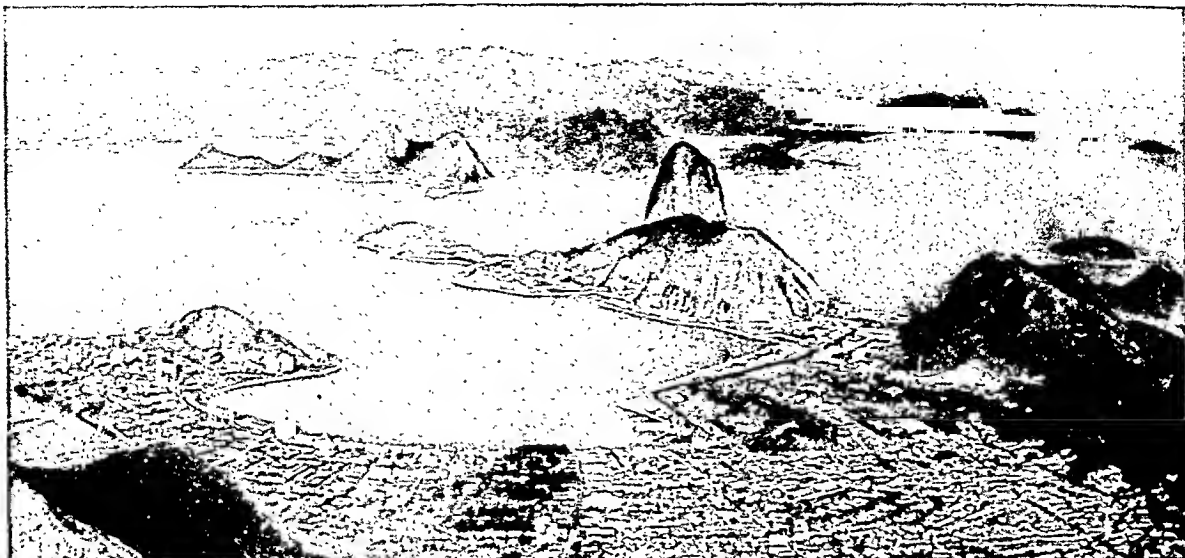
the natives. Bitterly hard labor and brutal treatment killed the red men by the hundreds. The first man to interfere in their behalf was Bartolomé de Las Casas, the "apostle of the Indies."

He was a young lawyer in Spain when his father, who had accompanied Columbus on his second voyage, sent him to Hispaniola to manage a newly acquired estate. In 1510 he became a priest, the first to be ordained in the New World, and began his life's work by freeing all the Indians over whom he had control.

When his neighbors refused to follow his example, he journeyed to Spain and obtained from Charles V an order that Indians must be paid for their work unless they were cannibals. He himself was appointed "protector of the Indians." In his zeal for the red men, he advocated the substitution of Negro slaves—a measure he bitterly regretted later on.

In 1523 he entered the Dominican Order and gained the assistance of this powerful organization. In 1530 he won a decree freeing the Indians of Peru. Yet the government made little effort to enforce the new laws. Opposed by numerous enemies, Las Casas retired to Spain in 1547. Before his death he had the satisfaction of seeing the gradual emancipation of the Indians begun. His book, 'A Brief Relation of the Destruction of the Indies', told such gruesome truths regarding the Spaniards' treatment of the red men that for more than 300 years it remained unpublished.

The STIRRING Panorama of LATIN AMERICA



Latin America combines ultramodern civilization and primitive wilderness. Here is one of the world's most beautiful cities, Rio de Janeiro, Brazil, as seen from the statue of Christ on Corcovado Mountain. Beyond Botafogo Bay rises famous Sugar Loaf Peak (Pão de Açúcar). It guards the entrance from the Atlantic (right) into the wide, island-studded harbor.

LATIN AMERICA. Twenty republics make up Latin America. Their lands stretch for more than 6,000 miles from the Rio Grande to Cape Horn. Seven of them—Mexico, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama—are in North America. Three—Cuba, Haiti, and the Dominican Republic—are in the West Indies. Ten—Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile, Argentina, Uruguay, Paraguay, and Brazil—are in South America.

In certain respects these countries differ greatly. Some are peopled mostly by Indians, others mostly by whites. Brazil speaks Portuguese, Haiti speaks French, and the others speak Spanish.

But in other respects they are much alike. They all fly a republican flag, they are all young and vigorous, and they all have their golden age before them.

All are rich in the raw materials and foodstuffs which other nations need to supply their factories and feed their peoples. And all are being attentively eyed by these many nations that want a share in their trade and their markets.

Latin America Commands World Attention

HERE IS the greatest uncrowded expanse of fertile land on the globe. Here is room for the swarming populations of Europe and Asia. Argentina alone has room for millions of settlers. It could double its population before it would be as thickly settled as Texas. Here is a wealth of resources that no one can estimate. Brazilian coffee and rubber, Argentine wheat and beef, Chilean nitrate, Bolivian tin, Peruvian copper, Venezuelan

Resemblances and Contrasts Among the Twenty Republics South of the United States; the Character of the People, Their Traditions and Customs, Culture and Future Prospects.

petroleum, Cuban sugar, Costa Rican bananas, Mexican silver—these are just a few items of this wealth. Here are markets for the manufactured goods of other lands. Here are astounding cities. Rio de Janeiro, many visitors believe, is the most beautiful capital in the world. Here are

splendid circles of intellectual leaders, equal in brilliancy if not in numbers to similar groups in Europe and the United States.

It is natural then that Latin Americans should look to the future with boundless hope and should be energetically preparing for it. Brazil spends millions in enlarging and modernizing its capital—hewing down hills and pushing the land farther out into the sea to get more room. Argentina is building up great industries; and its capital, Buenos Aires, at vast cost cuts through the crowded business section to make a thoroughfare 460 feet wide with five roadways separated by strips of park. Chile is building factories and pushing with renewed vigor its pioneer social security program. Uruguay, Venezuela, Cuba, El Salvador, and other countries are energetically working to protect the health of mothers and children. Colombia, cut in two by high mountains, uses the airplane to overcome this barrier to unity. Everywhere one finds the people striving to remove ancient handicaps and to build for a glorious future.

Latin America's potential power is attracting the attention of the world. Trade missions from foreign industrial countries are found in every city of importance. Political, racial, cultural, and religious groups are sending representatives to spread their ideas. Recent literature from France, Switzerland, Portugal,

England, Spain, and other countries is seen in the libraries and the bookstores. Great Britain is seeking to extend its commercial influence, and Spain its cultural influence. Before the second World War, German Naziism, Italian Fascism, and Russian Communism had developed highly effective propaganda programs; and Japan was sending merchants, farmers, and laborers to promote its interests.

The United States, after long neglect, is likewise developing an active program for promoting friendship with the southern countries. It is pushing this program with energy to make up for its past indifference to its southern neighbors and its failure to understand them. Too long the people of the United States have assumed that their country alone was "America."

Who Are the Latin Americans?

WHEN DWIGHT MORROW was selected by President Coolidge in 1927 to go to Mexico as ambassador and try to bring about friendlier relations, he said to himself, "I am going to like the Mexicans." He also began to consider how he could get the Mexicans to like the United States. One of the first things he did when he arrived in Mexico City was to take down the sign "American Embassy" from his new home and put up a brass plate saying "Embassy of the United States of America." That delighted the Mexicans; for they and all the other people of the Western Hemisphere have just as much right and are just as proud to be called Americans as have the people of the United States. Indeed, the name "America" was first applied to South America and the Caribbean area, and not to North America (*see America*).

Latin America the Early Home of Culture

Another great citizen of the United States, Elihu Root, won the hearts of the Latin Americans by recognizing that their civilization is the oldest in the New World. The occasion was an address before the third Pan American conference at Rio de Janeiro in 1906. When Mr. Root, then secretary of state, announced that he would attend, the Brazilians were overjoyed. They met him at the steamer with bands and flowers and soldiers. That night he was to make the opening speech of the conference. Would he win friends for his

country, which South America was criticizing for sending troops to Panama and the Dominican Republic? Or would he increase fear of powerful Uncle Sam?

With his opening sentence, he went straight to the hearts of the southern nations: "I bring from my country a special greeting to her elder sisters in the civilization of America." Here was recognition, not only that Latin Americans were Americans, but also that they were leaders in civilization—and that their civilization was older than that of the United States. They quote that speech even today.

Secretary Root was paying tribute to the fact that Latin American culture goes back four centuries. The first printing press in America was set up in Mexico about 1539, a century before printing began in the English colonies. The first university in America was founded in the city of Santo Domingo (now Ciudad Trujillo) about 1538. In 1551 two more universities were founded, one in Mexico City and one in Lima. When the first college was started in the English colonies (Harvard, 1636), Latin America already had six universities. In 1585 a literary contest was held in Mexico City in which some 300 poets took part. When the Dutch were trading trinkets to the Indians for Manhattan Island, the city of Asunción in the heart of South America was a well-organized community with schools, churches, and literary clubs.

Significance of the Term "Latin America"

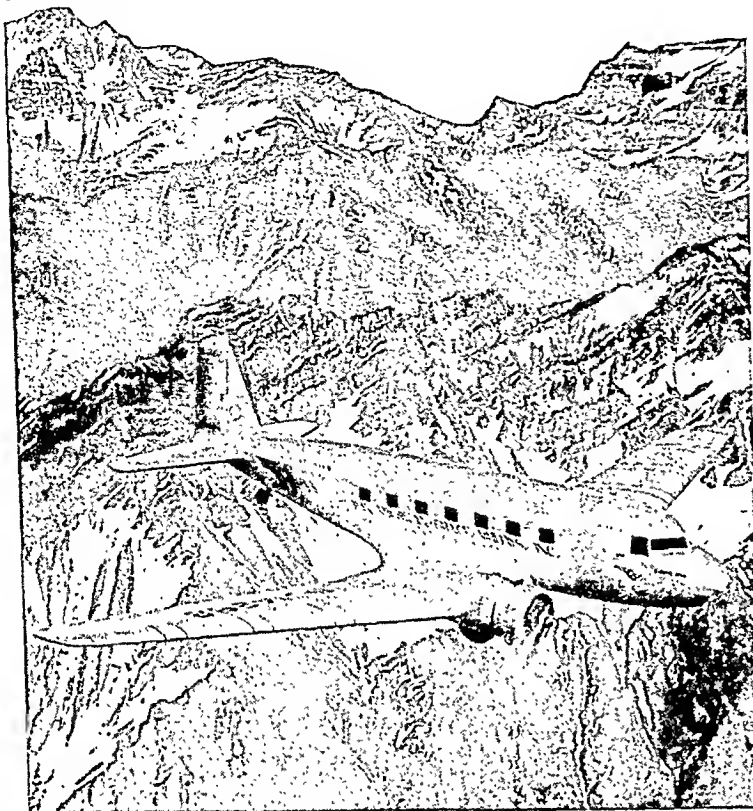
Where did this culture come from? From Europe, and chiefly from the three countries of Europe that derive their language and civilization from the Latin people—Spain, Portugal, and France. That is why these southern Americans have come to be called "Latin Americans." Of course, like many such popular terms, this is not satisfactory to many people. The Spanish, who colonized and gave their language to 18

LATIN AMERICA INCLUDES THOUSANDS OF ISLANDS



Not only are some of the large islands of the West Indies considered as part of Latin America, but also the numerous small coastal islands of Central and South America. This is a scene on one of the San Blas group near the Atlantic entrance to the Panama Canal. Its natives are pure-blooded Indians.

OVER THE ANDES FROM CHILE TO ARGENTINA



Mountain barriers tend to isolate most Latin American nations from their neighbors. Modern airplane transportation is providing new links between them. In many a remote region people who never saw a railroad train are familiar with the latest types of streamlined air transports.

of the 20 countries, would like to have it Hispanic America. But Brazilians, who speak Portuguese, and Haitians, who speak French, object to that. And it cannot be denied that the Latin way of looking at life dominates the peoples of the south, just as the Anglo-Saxon tradition dominates the people of the United States.

Latin influence has been greatly increased in late years by the large influx of Italian immigrants. It has been increased also by the growing contact with and admiration for French culture. French literature, French educational ideas, and the French language have been a powerful influence in intellectual life from the days when the people of South and Central America won their independence.

The Latin Outlook on Life

It is natural then that Latin Americans should have ways of living and thinking unlike those of people who live in "Anglo-Saxon" America. Life moves at a slower pace. The old Spanish custom of using the central square or plaza as a center of a city's social life still continues in many places. In what the northerner would term "business hours," people of all classes sit there and visit. In the evening, the band plays and everyone strolls around and around, the men usually going one way and the women another. The old rule that women must always be chaperoned still

prevails except in the large cities, where foreign influence is strong. In many places a man still begins to court a girl by "playing the bear," walking back and forth in front of her home, dropping a word as he passes the girl behind her barred window. He may later be admitted to her house, but there is a chaperon near by up to the day of marriage.

Family life is strongly emphasized. The immense majority of the people are Roman Catholic and divorce is rare. The head of the house has a position of honor and authority over his large family, which includes cousins and grandchildren, uncles and aunts, nephews and nieces. Children grow up quickly and spend much time with their elders. Even high-school students like to read serious books such as Emerson's 'Essays' and Victor Hugo's 'Toilers of the Sea', and most young people write poetry. Boys begin early to show an interest in political problems.

Courtesy and friendship, love of beauty and of children, are attractive qualities in Latin Americans. They are seldom in a hurry. Friendship comes first and business second. A stop on the country road to inquire the way is likely to bring you an invitation for a visit. After that the host may insist on riding ahead with you to be sure that you take the right turn at the next fork of the road. They love conversation, especially about ideas. They are less likely to talk about practical questions or news or the weather than about theories and speculations—why life is what it is and how it would be if certain conditions were different.

With their profound interest in the poetic and philosophic aspects of life, many Latin Americans care little for business. For this reason the North American businessman is likely to look on the Latin American as impractical and even backward. The Latin American, on the other hand, is likely to call his northern neighbor a money-chaser.

But each of these two great groups of people can profit by having neighbors so unlike themselves. The northerner can tone down his brusqueness, his hurry, and his preoccupation with practical affairs by absorbing some of the Latin leisurely and meditative spirit. The southerner can supplement his charm and poetry with some of the northern emphasis on efficiency, order, and respect for property. Young people of the United States could well imitate their southern neighbors in giving more time to studying and discussing political and social questions. Latin American youth might profit by more general use of group games like baseball and football, which teach the individual to play for the honor of the team rather than just for

himself. From these games he could learn to accept political defeat as he would accept defeat on the playing field, without resentment or revolt.

Differences Among Various Countries

Alike as they are in many ways, it would be a mistake to lump all the twenty Latin American countries together in our thinking. Two important causes of difference are climate and elevation. Many of the people live in the hot, wet tropics. They naturally have less drive and energy than those who live in cooler climates. All the west coast countries of South America are greatly influenced in their development by the high Andes Mountains, which not only are a barrier to transportation and communication, but also make education and other unifying processes exceedingly difficult. On the other hand, the great plains of Argentina, Uruguay, and Brazil make for unity and facilitate progress. The fact that the east coast of South America was open to Europe, and the west coast was far removed from the rest of the world until the opening of the Panama Canal, helps to account for other differences in development. Again, the influence of the United States has been large in Mexico, Cuba, and other neighboring lands of the Caribbean.

The various Latin American nations also differ from one another in racial composition. Argentina's population is almost entirely white. Haiti's is black. Guatemala's is 60 per cent pure Indian. In nearly all the republics these races have intermarried. But in each country, the pattern of culture and development is largely set by the most numerous element in the population. A knowledge of the racial situation is

most important, therefore, if we are to understand the differences as well as the likenesses in the various parts of this large region.

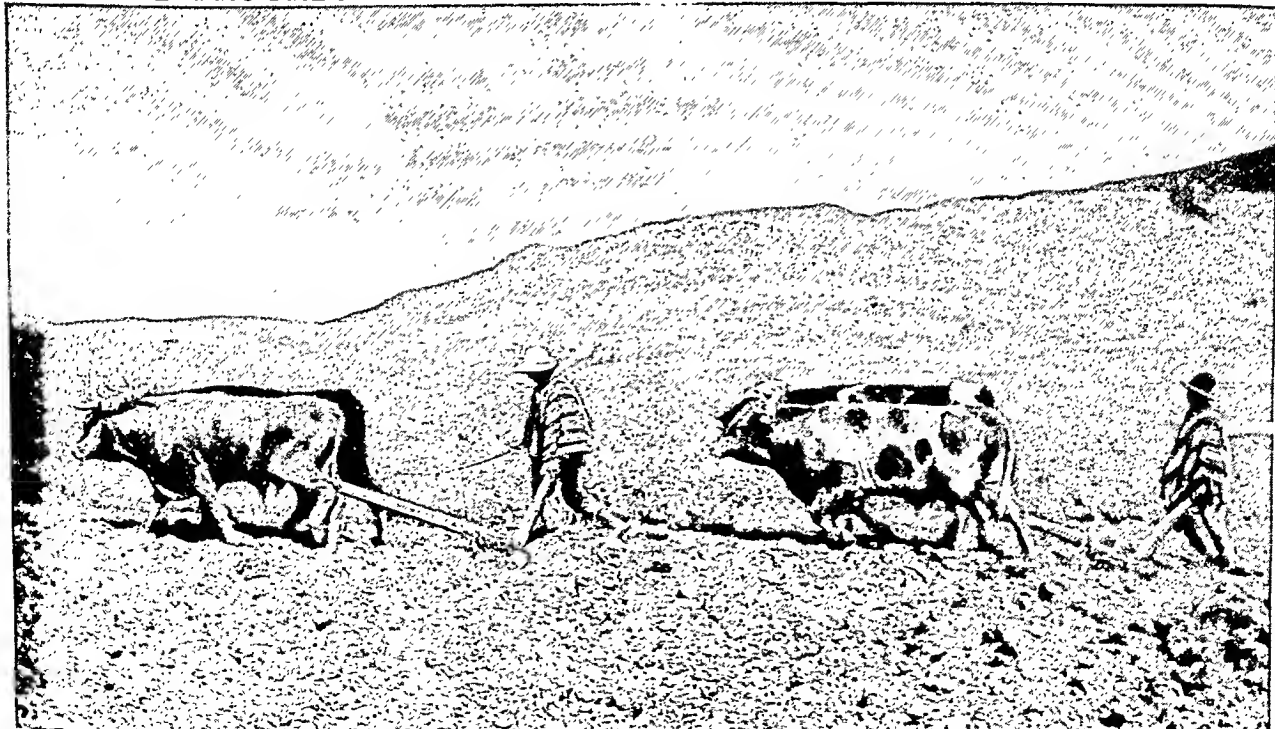
Racial Makeup of Latin America

LATIN AMERICA is made up of two original stocks, Iberian (Spanish and Portuguese) and Indian. Soon after the two stocks had begun to mix, a third was added, the Negro slaves brought from Africa. A long time afterward, during the 19th century, a modern immigration movement began. This added a fourth element consisting of new arrivals from many parts of the world.

The Indians—the Original Americans

The Indians that the Spanish conquistadors (conquerors) found in the New World were of two kinds. Uncivilized tribes, like those that the French and English colonists met farther north, were living in the Caribbean area, in the valley of the Amazon, and in the southern plains. A second and far more important division of the aborigines included the groups that lived mostly in the highlands. These groups had developed remarkable civilizations. The most advanced peoples of this highland division were the Toltecs of the central plateau of Mexico and the Aztecs who conquered them; the Mayas of Yucatan and Guatemala; the Chibchas of the Colombian plateau; and the tribes constituting the Inca Empire. The Mayas, with their highly advanced architecture, sculpture, and science, might be called the Greeks of America. The Aztecs, great warriors who conquered a more highly civilized people, recall the Romans. The Incas were the states-

LITTLE PROGRESS HERE SINCE THE DAYS OF THE INCA EMPIRE



In this high Peruvian valley the Indian farmers till their field with wooden plows. They owe their oxen to the Spanish conquerors but in other respects they are perhaps no better off today than they were when the Incas had their capital at nearby Cuzco.

men of the day, like the ancient Egyptians and Babylonians, ruling territory that stretched 1,200 miles along the western highlands and mountains (see Indians; Aztecs; Incas; Mayas).

All these civilizations were conquered by the Spaniards. That a small group of warriors could overpower such large, well-developed empires is astonishing. Some of the reasons suggested by historians are: (1) the internal divisions within each of the Indian empires; (2) the white man's use of firearms, armor, and the horse, which the Indians had never before seen; (3) the superstitions of the Indians, which led them to believe that the white men might be gods; (4) the lack of initiative resulting from their paternalistic and despotic systems, which did not inspire leadership.

The Spanish Conquerors

The conquistadors were extraordinary men. Audacity, courage, cruelty, nobility—all were combined in such adventurers as Balboa, Cortez, Ponce de León, and De Soto. Many of them had been trained on the battlefields of Flanders or in the campaigns which drove the Moors from Spain. With equal courage they faced savage Indians, mysterious forests, and unending

PRIMITIVE INDIANS



Slender, sturdy, and proud, the natives of the Ecuador jungle are a far more high-spirited people than the natives of the highland.

deserts. And inside of fifty years they had mastered half of the New World for themselves, their king, and their church.

In 1519 Cortez conquered the mighty Montezuma and by 1521 he was master of Mexico. By 1535 Pizarro had plundered Cuzco, the rich capital of the Incas, and had founded Lima, "city of the kings," in Peru. By the middle of the 16th century others had brought most of the West Indies and Central America under the dominion of Spain. Florida and much of the Mississippi Valley had been explored. The government and the church had begun to create orderly communities. Destruction was succeeded by construction—new cities, new churches, new schools; yes, even a new race. For with marriage of the

whites and the Indians came the *mezizo*, the most numerous element of the population, in whom two racial heritages are blended.

African Contribution

The abuses heaped upon the Indians in the forests and mines of the tropical Caribbean lands killed off so many of them that the Spaniards began to import African slaves. The Portuguese did the same in tropical Brazil. Soon the Negro became a third large element in the population of these countries. All the republics freed their slaves in the course of the 19th century. Today Negroes are recognized

as an important element in the national life of Cuba, Brazil, and other countries. Haiti has been a "black man's republic" since its founding in 1804. In countries such as Argentina, Chile, Peru, and Mexico, which brought in fewer African slaves, Negroes have been so thoroughly absorbed in the population that one can seldom detect any African features. Although reliable statistics are lacking, there are indications that the black population in Brazil and the Caribbean countries is gradually becoming brown.

Modern Immigrants

In addition to the three primary strains—Iberian, Indian, and African—there are large groups which came later from Europe and Asia. This modern immigration movement, which began in the 19th century, was especially heavy in Brazil, Argentina, and Uruguay.

Italian immigrants outnumber those of any other nationality. Buenos Aires has about as many Italians as Rome. Brazil has more than two million people of Italian descent, most of them in the state of São Paulo. Spaniards have continued to come in large numbers to all countries except Brazil, where the original Portuguese element has been increased by a steady stream of newcomers.

The Germans form the largest non-Latin group. They are especially strong in southern Brazil and Chile. The English, Scottish, and Irish groups are comparatively small but influential. In the early records of the struggle for independence, the Nelsons, the Edwards, the O'Higginses, and similar names appear frequently. Today many leaders in railway, bank, and

PURE-BLOOD NEGRO



Along the Caribbean shores and in eastern Brazil are many Negroes like this giant river-boatman. They are descendants of African slaves.

business enterprises are of British descent. The "word of an Englishman" is equivalent to our "word of honor." From the United States there has been little permanent immigration, except in Mexico. Poles, Russians, and people from the Balkans are scattered through sections of eastern South America.

The Japanese are particularly strong in Brazil and in Peru. Chinese are found chiefly in Mexico, Peru, Panama, and Cuba. Havana has a large colony of Chinese, many of them stranded there in a vain attempt to enter the United States.

There are several hundred thousand Jews. Argentina has by far the largest number, most of them in Buenos Aires and in settlements of the Jewish Colonization Association in the north. Brazil has large Jewish colonies, particularly in Rio de Janeiro and São Paulo. Mexico's Jewish colonies have been growing, and Uruguay, Colombia, and Cuba have smaller settlements. Small numbers of Jewish refugees from Europe have recently settled in most Latin American countries.

Racial Tendencies Today

Latin Americans usually pride themselves on their lack of race prejudice. In the three largest countries—Brazil, Argentina, and Mexico—there are today three distinct racial tendencies.

Brazil is making the world's most interesting experiment in race mixture. It is deliberately setting out to absorb all the racial groups within its borders and thus to form a "cosmic" or universal race. This will include such diverse elements as the original Portuguese, the Africans who came as slaves, and the Japanese colonists and merchants who have entered in recent times. When the consul general of Brazil in New York City was asked about the difference between the treatment of Japanese in California and Brazil, he said, "In California they seem to be afraid that Japanese will intermarry with the nationals; in Brazil we are afraid they will not." What particular color will predominate as one walks along the streets of a Brazilian city a hundred years from

now does not bother the people today. What they desire is that all shall be loyal Brazilians.

Argentina, on the other hand, is almost entirely white. Its major industry of raising cattle and selling them in Europe never called for the labor of African slaves or of the native Indians. As early as 1852 the Indian population had shrunk to about 100,000. They had been steadily pushed off the desirable agricultural lands of the Pampa, over which they had hunted like the Plains Indians of North America. In 1879 Gen. Julio Roca drove them far into the south, opening a vast territory for the ever-increasing flood of immigration from Europe. Uruguay, Argentina's neighbor to the north, is almost as definitely white. Other countries in which the whites are a large element of the population are Chile and Costa Rica.

Mexico Turns Indian

Mexico is almost as dominantly Indian as Argentina is white. At least 90 per cent of its people are Indian or have Indian blood. The policy of the government, since the beginning of the social upheaval—the "revolution"—in 1910, has been to build a new Indo-American civilization. In many parts of the country the capitalistic régime of the whites is being replaced by the ancient Indian communal system. The lands which the Indian village communities long ago lost to the big landlords are being restored. The Indian's art, his weaving, his dances, his folklore are being revived.

Other countries of Latin America where the Indian and mestizo population is especially large are Guatemala, Ecuador, Peru, and Bolivia. The Indian element is also strong in El Salvador, Honduras, Nicaragua, Colombia, Venezuela, and Paraguay. None of

these countries, however, has made so determined an effort to advance the interests of the Indian population as has Mexico.

While the wandering lowland tribes throughout Latin America are rapidly dwindling, the highland Indians, descendants of the civilized agricultural tribes, seem

A PURE INDIAN AND A MESTIZO



In the upper picture an Indian woman of the Ecuador highlands is carrying a clay water cooler to market. Below is a woman of the same Indian blood, but with a mixture of white Spanish ancestry. She is a skilled weaver of the so-called "Panama" hats.

to be gaining. In 1650 colonial authorities estimated that there were 13 million aborigines. The pure-blooded Indians are now estimated at 20 million.

Population Estimates

The following estimate of population for the 20 republics is based on an average of the figures given by various recognized authorities:

Mestizos (mixed Indian and white).....	78,000,000
Whites.....	30,000,000
Indians.....	20,000,000
Negroes and mulattoes.....	18,000,000
Zambos (mixed Indian and Negro).....	3,000,000
Asiatics and unclassified.....	1,000,000

Total (20 republics)..... 150,000,000

These figures do not include the islands and the territories in Central and South America owned by foreign powers—British Honduras, the Guianas, and most of the West Indies.

The above figures should be regarded only as intelligent guesses, since most Latin American governments have not yet developed accurate statistics, nor do they desire to draw fine racial distinctions. Indeed, Latin America boldly challenges the theory of racial superiority. This challenge grows out of the very nature of the Latin American. He is neither European nor yet exclusively American; neither occidental nor oriental; not white, red, or black. He partakes of them all. A roll call of the heroes of Latin America would emphasize this refusal to make distinctions between men because of their blood. Benito Juárez* and Díaz, the Mexican heroes, were pure Indians. San Martín of Argentina was pure Spanish. Antonio Maceo of Cuba was a Negro. The greatest of all Latin American leaders, Simón Bolívar of Venezuela, was part Indian. All are equally honored, with no distinction of race.

Contrasts Between the Peoples of the Two Americas

IT IS NOT well to emphasize too much the difference between Latin Americans and "North Americans," as the

southerners call the people of the United States. For they are all citizens of a New World, they have selected the same republican form of government, and they have a common faith that they will develop a system of life far better than that of Europe with its many limitations and its ancient hatreds. Yet it is helpful to recognize certain basic contrasts in ancestry, in physical surroundings, and in history.

Conquerors and Colonists

British and Dutch colonists came to a cold climate. They had to work or freeze. Spanish and Portuguese settlers came to a warm climate that would slow down the most active character in the world.

The Puritans who came to New England, the Roman Catholics who settled in Maryland, the Quakers who founded Pennsylvania colony, all were trying to

get away from religious persecution at home. They hoped to find political liberty as well as freedom of worship. They brought their families and built new homes and new social institutions. They set their affections on the New World and expected to retain few relationships with the Old.

The conquistadors of the south came to America to get gold for themselves and their king, and to win converts for their church. They had no thought of setting up new forms of government or religion, and were always looking forward to a joyous return to Europe. Having left their women behind, many took Indian wives; but they seldom set up real homes. The colonists who followed in the wake of the conquistadors also remained faithful subjects of the Spanish and Portuguese monarchs. Their political, cultural, and religious life continued to center in the homelands. For three centuries they had no thought of cutting loose from the European system that ruled them.

Indians of the North and South

Just as important as the difference in the colonists that settled the northern and southern parts of the New World was the difference in the Indians they encountered. The North American colonists found wandering tribes that lived by hunting and fishing. To have intermarried with these nomads or to have retained them as farm laborers would have been impossible. The conquistadors, on the other hand, found well-established civilizations over large areas. They found people living in permanent homes and cultivating farms. So the Iberian colonists took these lands as proprietors and made serfs of the original owners.

Thus began the great landed estates which have been the curse of Latin America during its entire history. These immense estates, some of which cover millions of acres and employ thousands of peon laborers, still exist in most of the southern countries. That is why immigrants in some countries find it difficult to get a foothold on the land. It is why millions of Indians in Peru and Bolivia remain in semiformal peonage. This was the primary cause of the Mexican "revolution" which began in 1910.

Lack of Preparation for Democracy

The North American colonists formed a complex group representing many different nationalities and creeds. They were influenced by the political and economic upheavals that profoundly changed northern Europe in the 17th and 18th centuries. To achieve order and unity under these conditions, they had to learn the lessons of tolerance and democracy. Their material progress was later promoted by the Industrial Revolution in Europe (see Industrial Revolution). The settlers of Central and South America, in contrast, were under the sole influence of Spain or Portugal, with a common religion, tradition, and culture. Other nationalities were excluded. Trade was confined to the mother countries, where the Industrial Revolution had not yet penetrated. Thus there were few influences tending to encourage political change or to produce such striking economic progress as in North America.

*In conformity with the present-day trend to preserve the native forms of foreign names, Spanish and Portuguese names in this article are written with the accents which they have in those languages, even though they commonly appear without accents in English and American works. For pronunciation, consult the Fact-Index.

From these comparisons it is easy to see why the Latin American countries have failed to move as rapidly toward democracy as did the United States. When the Spanish and Portuguese colonies won their independence, many of their leaders, recognizing the lack of training for democracy, thought that the new countries ought to begin as limited monarchies instead of republics. Brazil, indeed, remained a monarchy until 1889. But the Spanish Americans, inspired by the heroic exploits of the French and American revolutions, at once set up republics modeled on the pattern of the United States. Centuries of colonial subjection were a poor preparation for this republican experiment. Only today, after a century of self-rule, is education becoming sufficiently widespread to give hope that the democratic goal can be reached.

**Some Heroic
Figures of Latin
America's Past**

ONE OF the best ways to get an understanding of the Latin Americans and their history is to

know the stories of their great leaders. In them one finds all the diverse elements of Latin American character. The colonial period may be summed up in the careers of Hernando Cortez, Bartolomé de las Casas, and Juana Inés de la Cruz. Cortez (1485-1547) stands for that combination of heroism, cruelty, lust for gold, and loyalty to king and church that imposed the Spanish system on the longest stretch of colonial empire in the world, from California to the Strait of Magellan (*see* Cortez, Hernando). All that is finest in the Christian church is represented in Father Las Casas (1474-1566)—protector of the Indian, educator, philanthropist, prince of peace in a world of war (*see* Las Casas, Bartolomé de). Juana Inés de la Cruz (1651-1695) embodied the virtues of Latin womanhood and the persistence of Spanish culture and religion in the wild frontier life of America. A beautiful lady-in-waiting in the viceroy's court in Mexico City, at 17 she was so familiar with the classics and philosophy that her reputation spread over America and Europe. She was one of the first champions of women's rights. Tiring of the admiration which her beauty and brilliance brought her, she sought quiet in a convent. There she gathered in her cell more than 4,000 volumes. She died at 44, exhausted from nursing the victims of a small-pox epidemic in Mexico City. "The Tenth Muse" she is called because of her learning and her deeply thoughtful verse. (*See* Latin American Literature.)

The Great Liberators

The struggle for independence (1810-25) revolved around such great men as Simón Bolívar of Venezuela, José San Martín of Argentina, and Miguel Hidalgo of Mexico. Bolívar was one of America's greatest char-

acters. Bold military leader, writer of constitutions, brilliant statesman, author of distinction, friend of most of the great men of his day, he was a genius of the first order. He is the national hero of six nations which owe him their independence—Venezuela, Colombia, Panama, Ecuador, Peru, and Bolivia. Like many another Latin American leader, he passed

A FAMOUS LATIN AMERICAN HEROINE



Juana Inés de la Cruz, 17th-century Mexican nun, won renown for her beauty, her poetic talent, and her self-sacrifice in the care of the poor.

his later years in a shadow, crushed by failure to attain his too impractical ideals (*see* Bolívar, Simon).

General San Martín started from Argentina, as Bolívar did from Venezuela, to liberate the southern part of the continent. His remarkable march with his army over the Andes in 1817 was a greater feat than Napoleon's march over the Alps. He freed Chile and carried his armies north into Lima, where he proclaimed the independence of Peru. When differences arose between him and Bolívar, he unselfishly left the field and died in exile in Europe. Not so brilliant as Bolívar, he gave to South American youth a model of moral nobility they can never forget.

Different from both Bolívar and San Martín was the leader of the liberating movement in Mexico. Hidalgo was a native Mexican priest who loved his Indian people and tried to better their terrible living condi-

tions by ending the abuses of the government. But his religious superiors joined with the colonial officials to oppose him. On Sept. 16, 1810, he and his Indian followers began a movement for independence. This was finally attained in 1821. In the meantime the great-hearted Hidalgo was excommunicated, captured, and shot as a traitor. But to Mexicans today he is the Father of his Country.

Dictators, Statesmen, and Writers

After the great liberators had won independence for their nations, then began the long hard journey toward democracy. Without proper preparation, stable institutions of law and order were slow to develop. If

we study events alone, from 1825 to the opening of the 20th century, we see little but revolutions, dictatorships, and periods of anarchy. But when we begin to study characters, we see much to admire.

Many of the dictators, called by the people *caudillos*, or chiefs, were often not only forceful leaders but men of other fine qualities. Like some of the frontier heroes of

the United States, they were quick on the trigger, because they believed that was the only way to bring order out of anarchy. There is no more exciting reading than the stories of some of these men: Juan Manuel Rosas of Argentina, Gaspar Rodríguez Francia of Paraguay, Gabriel García Moreno of Ecuador, Porfirio Díaz of Mexico. They and others like them controlled most Latin American countries through the 19th century.

The dictators had their opponents, whose lives give an equally interesting picture of those troubled times. Take for example Domingo Faustino Sarmiento of Argentina, called "Crazy Sarmiento" by his opponents, who hated his love for schools and for the United States. Sarmiento was born in 1811, two years after Abraham Lincoln. He admired Lincoln greatly, and led a life that paralleled Lincoln's in many ways. His parents, very poor, lived in the frontier town of Mendoza. He had little schooling and got most of his education by reading and rereading a few great books, several of them the very books that inspired Lincoln. When he was 17, he was exiled because of his opposition to the dictator Rosas. In his wanderings he began the study of education and democracy, which became the primary concerns of his life. While he was in the United States, he met the great educator Horace Mann. Captured by Mann's ideas, he wondered

how he might put them into effect in his own land. Then came the surprising news of his election to the presidency, which like Lincoln's might be called a political accident. As president, 1868-1874, he did so much for public schools that he became known as the "schoolmaster president." His was the first government in Latin America to bring teachers from the United States. With their help he started a system of normal schools and kindergartens, and began the development of the admirable public school system which Argentina enjoys today.

Another heroic character who, like Sarmiento, worked to bring order and organization out of confusion

and revolution was Andrés Bello (1781-1865) of Chile. The visitor to Santiago will never forget the fine benevolent figure of Bello, carved in marble and seated serenely in a great chair, before the presidential palace. He was born in Venezuela, taught the great Bolívar, and represented his country in London during the independence movement. Called to Chile to or-

ganize the young republic's educational life, he codified its laws, organized the University of Chile, and set all Latin America a high standard for scholarship.

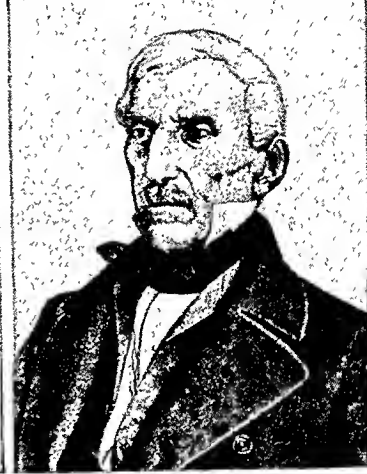
The centennial of the birth of another of these great men, Eugenio María de Hostos, was celebrated by all Latin America in 1939. Born in Puerto Rico and educated in Spain, he contributed something to the development of almost every Latin American country. In Chile he started the plans for the Trans-andine railroad and opened the university to women. In Peru he strove to prevent mistreatment of the Chinese immigrants and made a long fight against graft in building the famous Central Railroad, the highest in the world. In Venezuela he taught law in the university. In Cuba he gave great impetus to the movement of *Cuba libre* ("free Cuba"). In the Dominican Republic he spent 15 years in reorganizing the educational system. He wrote outstanding books on such widely varying themes as constitutional law, commentaries on Shakespeare's plays, social science, and pedagogy.

Latin Americans seem to be born with a natural gift for writing, and they honor their great writers to a degree that astonishes visitors from other countries. Sarmiento wrote 52 books, De Hostos about the same number. The Chilean José Toribio Medina, whose death in 1930 was mourned by all the Spanish-speaking

FATHERS OF SPANISH-AMERICAN INDEPENDENCE



Simón Bolívar



José San Martín

TYPICAL SPANISH COLONIAL CHURCH ARCHITECTURE



This is the Church of La Merced in Antigua, Guatemala. Rebuilt after an earthquake in 1773, it is an excellent example of the massively built Spanish American churches, with their small windows leaving wide spaces for beautifully detailed decoration.

world, wrote and edited more than 250 volumes. Many of these he printed on a little press in his own home. When the Mexican poet Amado Nervo died at a Pan American conference in Montevideo, his body was accompanied to Mexico by Argentine and Uruguayan cruisers. In Mexico the whole nation declared a holiday on the day of his funeral. His death caused more comment in Latin America than did the opening of the Panama Canal. When Ricardo Rojas, a celebrated Argentine writer, completed his 25th year of authorship, his compatriots celebrated the event in an elaborate ceremony attended by the President of the republic and representatives from many foreign countries. (For a survey of the literature of the various republics, see *Latin American Literature*.)

Culture, Recreation, and Education

LITERATURE is the most highly honored art form in Latin America. But the Latin

Americans also express themselves with facility in all the other arts, and some of their painters, musicians, and sculptors have won world-wide fame.

There are three principal strains in the cultural life of the Latins of the New World. The first is Indian—the contribution of the native inhabitants, who in some instances possessed a highly developed civilization of their own. The second of these strains is European—the arts and the ways of living brought during the 16th century by the Spanish and Portuguese colonists. Out of these two strains emerged, during the period of independence, what might be called a third, and truly New World, culture. This is expressed in the painting of Mexico and Argentina, the sculpture of Chile, and the music of Brazil. Here the artists have drawn on their European heritage for

technique and on their native surroundings for subject, to produce excellent and original works of art.

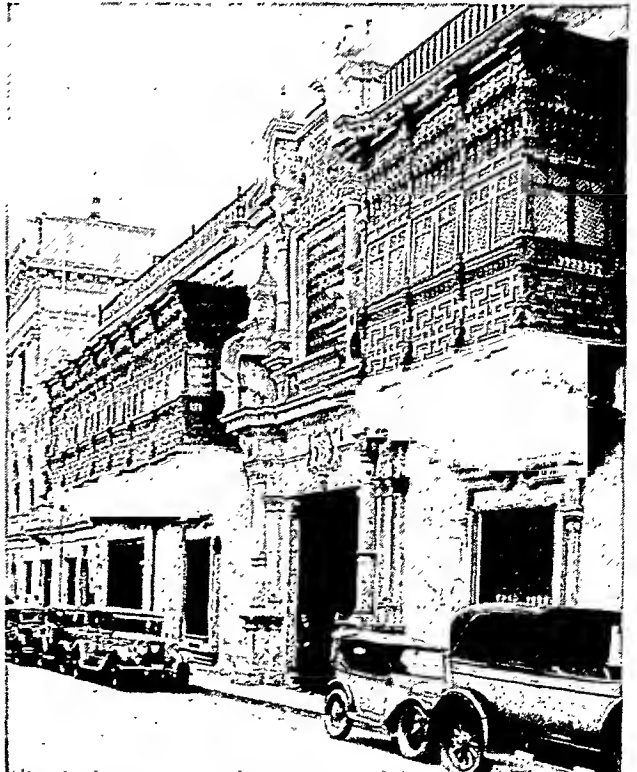
Painting, Sculpture and Architecture

During the colonial period, the European settlers had little leisure to devote to the fine arts. Such works of art as were produced were mostly a pale imitation of European models. Spain and Portugal exercised their greatest influence through the church. Missionaries taught the natives many new crafts, and encouraged the practise of the old crafts with results that are still evident throughout Latin America in marvelous lace work, metal work, pottery, and wood carvings. Architecture followed Old World patterns. Churches were richly ornamented in the florid baroque style. Houses were generally built of stone, with small grilled windows, flat roofs, and a central *patio*. In re-

cent years some of the large cities have begun to build tall structures like the skyscrapers of the United States, and apartment houses of modern design.

After Spanish America broke away from the mother country, painters and sculptors from many parts of

BUILT IN THE DAYS OF THE VICEROYS



The Torre-Tagle mansion in Lima, Peru, is perhaps the best remaining example of Spanish colonial residences. Note the carved overhanging balconies and the decorated entrance.

Europe came to the New World, attracted by the artistic possibilities in the vigorous new nations. But the political and social upheavals of the 19th century gave little opportunity for artistic expression. Moreover, artists continued to look to Paris, Rome, and Madrid for inspiration. Not until the close of the century did art of a more native flavor begin to appear.

This modern tendency is best illustrated in the work of a school of Mexican painters which arose after the revolution of 1910. The long-oppressed Indian struggling for justice became a heroic figure in the rich dramatic murals painted on the walls of public buildings by Diego Rivera, José Clemente Orozco, and Da-

PART OF A DIEGO RIVERA MURAL



In this fresco from the walls of the Casa de Cortes at Cuernavaca, Mexico, the painter shows the conquered Indians bringing food from their farms as tribute to Cortez, the conqueror.

vid Alfaro Siqueiros. They and their host of followers created a revolution in art that was quite as sweeping as the social revolution they celebrated. Native themes also dominated the work of the outstanding artists of the other republics. Cesáreo Bernáldez de Quirós of Argentina painted the gauchos of his native province. Candido Portinari of Brazil portrayed the life of the Negroes on the coffee fazendas. Cesar Villacrés of Ecuador started a trend with his broad free paintings of the native Indians. In sculpture Chile excelled, with Nicanor Plaza and Virginio Arias as the fathers of the modern movement.

Music, the Dance, and Other Recreations

The music of Latin America was long sharply divided into Spanish and native forms. Church music was the most significant influence in the early compositions of the European settlers. Typical of native music were the *vidalitas* and *estilos* of Argentina—short laments in ballad form, sung by the gauchos to the accompaniment of a guitar, as they contemplated the great open pampas. Such ballads of love, of sorrow, and of joy are popularly known as *corridos* and are sung everywhere by the common folk. With the increased interest in native art, modern composers began to weave into their music the simple melodies and rhythms of the Indians. This influence is discernible in the compositions of the Brazilians Carlos Gomes,

Heitor Villa-Lobos, and Fructosa Vianna; the Mexicans Carlos Chávez and Silvestre Revueltas; and the Peruvian André Sas.

More than any other art, the spirited folk dances of Latin America express the emotions of the people. Some of them, such as the tango, the rumba, and the conga, have delighted the public of the United States and other countries with their grace and verve. Many of the national dances are performed in groups. In the *pericón* of Argentina and Uruguay, couples dance in a circle to a varied tempo, accompanied by lusty shouts typical of a cattle-raising people. The Chilean *cueca*, by contrast, is danced by a single couple, and is highly individualistic; the man, at first swaggering in his cowboy garb, ends on bended knee, symbolizing a lover's submission. Some of the other popular dances are the *marinera* of Peru, the *bambuco* of Colombia, and the *jarabe* of Mexico. The *marizé* of Brazil has a distinctive African Negro rhythm.

Fiestas and Popular Sports

Patriotic and religious festivals are numerous. Hardly a month goes by without some special *fiesta* or festival. Christmas, Easter, New Year, Carnival, Columbus Day, Pan American Day, and Independence Day are everywhere celebrated with colorful processions and gaiety. In addition to these national holidays, every town and village has its own special fiestas to honor a saint or to celebrate the new harvest or to observe some special event such as the blessing of the boats in Brazil on June 29. Processions, music, folk dances, and flowers are features of all these festivals. (See Festivals and Holidays.)

Along with songs, dances, and popular festivals, the Latin Americans are spending an increasing amount of their leisure time in sports. In the 19th century the colonial pastimes of cock fighting and bull fighting were the chief forms of amusement. But in recent years these have declined in favor of soccer and Rugby football, baseball, basketball, boxing, tennis, cycling, rowing, and other sports imported from Europe and the United States. Pelota, or *jai alai* (*hí a-lí*), introduced into the republics from Spain, is also a popular diversion. Polo and horse-racing are favored by the wealthy.

The larger cities have magnificent theaters and opera houses. Here the finest artists of Europe and the United States perform before huge audiences, for the Latin Americans are passionately devoted to the opera, the symphony, and the drama.

Millions of people every week attend the motion pictures, most of which are made in the United States, with dialogue in the native language. Boys and girls eagerly follow the comic strips of the United States. These games and diversions, which all the Americans now share, are a powerful factor in cementing inter-American unity.

Education, Universities, and Schools

In colonial times, schools and universities patterned after those of Europe trained the sons of the upper classes to become leaders in the church and in the pro-

fessions. Missionary schools gave the Indians instruction, chiefly in religion and the manual arts. After the winning of independence, leaders like Sarmiento urged the establishment of public schools to fit the people for the responsibilities of self-government. But progress was slow. The new republics were poor and often disturbed by political quarrels. There was no middle class to demand and finance a program of education for all. And so the tradition of special opportunities for the few and a minimum of

MARIMBA PLAYERS OF GUATEMALA



The marimba is the ancestor of the xylophone. It consists of strips of wood of different lengths with tuned resonators underneath. Bladders are attached to the resonators to intensify and alter the quality of the tone.

education for the many long survived. But in recent decades there have been great advances, despite the struggle in many countries between government and church over school control and educational policies.

Each of the twenty republics has a minister of education who is responsible for the public school system. Attendance is required by law. But sparse, scattered populations and small budgets have so far prevented even the most progressive countries from putting schools within the reach of all. Even in Argentina about one quarter of the children of elementary school age are not in school. And in Latin America, as a whole, the vast majority of children do not get beyond third grade. Yet some countries have spent 20 per cent of their total budget on schools.

The various countries differ widely in their educational development. In South America the best organized school systems are in Argentina, Uruguay, Chile, and Brazil. In northern Latin America the leaders are Costa Rica, Mexico, and Cuba. Mexico has become famous in recent years for its rural schools.

The educational program for each nation provides four general types of instruction: Primary or elemen-

tary, secondary, normal (teacher, education), and cultural or professional. Elementary instruction in the more advanced sections consists of a six-grade course which a pupil is expected to complete in as many years. In many sections, however, only two to five grades are provided. Secondary schools include another five or six years of instruction.

Cultural, professional, and technical instruction is given by the universities and professional schools. The majority of the republics have universities which

offer courses in philosophy and the liberal arts, law, medicine, and engineering. The length of the courses varies according to the end in view. In general, the degree of doctor of letters or philosophy may be attained in four years, and doctor of medicine or of law in six years. Some countries provide advanced instruction in engineering, industrial, mechanical, and civil, with a five- or six-year course in each branch. The medical faculties usually offer courses in dentistry and pharmacy. Departments of economics, agriculture, and education are being organized, but are as yet in the earlier stages of development in many countries.

The quality of professional education, especially in South America, is steadily improving. The number of years demanded for a degree permits the inclusion of some of the cultural studies which in the United States and Canada are covered in college courses.

In most countries university organization and curriculum follow French or German patterns, though the influence of the United States has been felt in some countries and is becoming stronger. Most of the lectures are given by professional men or government officials who devote only part of their time to school duties. Consequently there is little personal contact between students and professors. Dormitories, "campus life," intercollegiate athletics, and what we call "college spirit" are generally lacking, though there are a few notable exceptions.

Private schools carry a large part of the educational load in some countries. They are of three kinds: those conducted by religious agencies, by individuals, and by foreign colonies. Roman Catholic schools are overwhelmingly in the majority. Protestant churches of the United States have schools in most of the principal cities. Foreign colonies, especially those from Britain, the United States, France, Germany, and Italy, have well-equipped institutions. Since foreign-language schools have in some cases been used as centers of propaganda, most governments now supervise private schools.

A notable characteristic of Latin American education is the interest that students in universities

and even in secondary schools take in public questions. The "student movement" of recent years has agitated for reforms in education and social organization. Students and laborers have united to bring about a new order, even at times taking up arms against abuses. The energy that youth in the United States expends on the athletic field is often used by Latin Americans in debating public questions.

The educational systems of Latin America have been constructed, like their political systems, on a highly idealistic basis. There can be no doubt of the desire of the leaders to minister to the educational needs of their people. The noticeable defect is on the practical side, in failure to meet actual needs and local conditions. But this defect is being remedied in many countries. Everywhere educational leaders are striving to improve the quality of instruction and make it more practical, to extend it to more of the children and to illiterate adults, and to provide better-equipped teachers.

Economic and Social Developments and Chief Problems

MANY OF THE difficulties which Latin America has met in trying to spread education and democracy arise from its economic handicaps. Though most of the republics won political freedom early in the 19th century, they continued to suffer from the defects of the old colonial economic system—vast estates, primitive mining methods, and isolation from the outside world.

Mountains and jungles make trade difficult. Among the most costly railroads in the world are those running from the coast up and over the Andes in Ecuador, Peru, Bolivia, and Chile. The famous Madeira-Mamoré Railway, built through the jungle to carry rubber from eastern Bolivia to the Amazon, was costly not only in money but also in life. For every tie laid, one native is said to have lost his life. To heighten the tragedy, by the time it was built the rubber industry in the Amazon had collapsed; and today much of the roadbed is grown over with tropical underbrush. The lack of highways and railroads has not only isolated the nations from one another but it has also kept each country divided into regions which have little intercommunication. Only now, with the airplane and motor truck, are these difficulties being partly overcome.

In their trade with the rest of the world, Latin American countries were hard hit by the depression which began in 1929 and by upsets in trade which started when the second World War broke out in September 1939. Before the war, difficulties were created by restrictive measures, such as quotas, exchange controls, and barter agreements. When war came, trade with Europe was reduced to a fraction of what it had been.

Raw Materials for the World's Markets

Much of Latin America's production is primarily for world markets. Normally it sells abroad most of its coffee, sugar, cacao, bananas, flaxseed, chicle, and a considerable fraction of its wheat, corn, and livestock products. Nearly all its tin, silver, copper,

petroleum, and other mineral products is produced for export. In exchange for these foodstuffs, raw materials, and minerals, it imports textiles, clothing, prepared foods, machinery, automobiles, railway equipment, and other manufactured articles of every kind.

In the years preceding the war, the United States took about one-third of all Latin American exports. Great Britain took about one-fifth and Germany about one-tenth. The United States supplied slightly more than one-third of the imports, and Great Britain and Germany together supplied slightly less than one-third, with Germany steadily gaining. Europe as a whole accounted for about one-half of all Latin American trade.

While European markets were demoralized during and just after the war, the United States handled a greatly increased share of this trade. It received two-fifths or more of the exports from Latin countries and shipped three-fifths of their imports. As the European nations recovered industrially after the war, they began retrieving their lost commerce. They had the advantage of being good customers for some of the area's raw materials which the United States also produced and therefore did not buy. The Latin American countries could get European goods in trade for these raw materials, though they lacked dollars for United States manufactures (*see* International Trade).

Handicaps to Profitable Commerce

Dependence of most Latin American countries on one or two products has been another great drawback. When Chilean nitrate, Bolivian tin, Brazilian coffee, Mexican oil, Cuban sugar, and Costa Rican bananas are in demand in foreign countries, the producing countries are prosperous. But when war or financial crisis or competition cuts down the foreign market for one of those products, then the Latin American country which depends on it suffers greatly.

Further, countries that primarily produce raw materials are always at a disadvantage in relation to countries that manufacture. Wages cannot be so high on farms or in forests and mines as in mills. The outstanding limitation on the economic development of Latin America has been its cheap labor. At least three-fourths of the people are miserably poor. This low standard of living limits purchasing power. It prevents large-scale industry with the low costs that come from mass production. It is also a tremendous drag on government, limiting the taxes it can collect to improve the country.

Foreign Investments and Interest Payments

Another problem arises from the great size of foreign investments. Like other areas under development, the Latin American countries have relied largely on foreign capital and foreign management to build their railways, port facilities, and public utilities and to develop their great manufacturing, mining, and agricultural enterprises. Most of the immense amount of capital thus invested has come from Great Britain and the United States. Interest payments and dividends on these investments, therefore, take considerable sums out of the Latin American countries every

year. In the depression years after 1929 many of the private enterprises thus financed failed, and many of the governments defaulted on their obligations to foreign bondholders.

Movements to Solve These Problems

The southern countries are working bravely to correct these evils. The problem of breaking up the large landed estates is being thoughtfully studied. Mexico has led in this. From 1917 to 1945 it distributed from the big estates some 65 million acres

More goods are being manufactured at home. Mexico is making its own shoes, hats, cotton goods, newsprint, chemicals, and even steel products. In 1920 Brazil had 13,300 industrial enterprises; by 1950 it had more than 60,000. The government is encouraging industrial expansion in Argentina. A new steel mill, built in Chile in 1950, has spurred the growth of manufacturing and trade there. Argentina, Mexico, and Chile lead in publishing and selling Spanish-language books. Branch factories are being built

RICH TIN MINE NEAR POTOSI IN SOUTHERN BOLIVIA



One fifth of the world's tin comes from Bolivia, but economy requires that Bolivian ores be mixed for treatment with purer ores from Malaya. Thus they are usually shipped to Great Britain, which controls the Malayan supply. Until recently, this condition prevented the United States from building smelters capable of producing tin directly from Bolivian ore.

of land to 2,135,000 families. The number of independent farmers with medium-sized farms is also increasing elsewhere, notably in Argentina and southern Brazil.

In many other ways the governments are trying to improve the conditions of their workers and give them more comfort and security. Many of the countries have labor laws that compare favorably with the most advanced codes in other parts of the world. They provide for minimum wages, hours of labor, the right of labor to organize, protection of women and children, and provision against accidents. Some countries have accident insurance, retirement and old-age pensions, and benefits for the sick. Special attention has been given to housing low-wage workers in Argentina, Brazil, and Chile. The need is still great in these and other countries, however, as soaring construction costs have limited low-cost housing. Nearly every country has a ministry of public health, which is lowering the toll of death and disease.

All countries are striving to improve and diversify their agriculture. Brazil is reducing its dependence on coffee by growing more cotton. Departments of agriculture study soils and markets to find profitable new crops. Agricultural experiment stations and extension projects in several nations have followed the success of the Coöperative Experiment Station set up at Tingo Maria, Peru, in 1942.

in thickly populated areas by many great industrial firms of the United States and Europe. They seek in this way to avoid high tariffs and restrictive regulations.

This development of factories does not necessarily mean that Latin America will soon develop great industrial centers and heavy industries. Advancement is limited by the lack of certain basic materials such as coking coal, by the shortage of skilled labor, and by the absence of a dense population with large buying power. It will be a long time before Latin America will be able to manufacture for itself the heavy machinery, the automobiles and other mass-production articles it requires, and the special fine goods that it now imports from abroad.

Steps to Control Foreign Capital

The development of industrial strength through new enterprises has encouraged Latin American countries to take steps to control foreign capital. Mexico has gone farthest in this respect. But practically every country in Latin America has adopted one or more of the following methods:

1. Sixty to 90 per cent of the employees of any corporation must be nationals of the country in which it operates.
2. Foreign firms must be domesticated in the country in which they operate and must be subject to its regulations.
3. Part of the profits must be reinvested in the country, and exports of capital and profits are restricted.
4. By control of foreign exchange, exports of money or

goods are regulated to suit each country's trade and political policies.

5. In some instances national governments have taken complete control of foreign investments. This has been done either by establishing a government monopoly to which foreign companies are compelled to sell their properties, or by expropriation (government seizure) of foreign property, with the more or less remote possibility of compensation.

Mexico and Bolivia provide examples of expropriation. They have taken over foreign petroleum lands, and Mexico has seized many large foreign holdings of farm lands for distribution to the peasants. Such seizures present the United States with one of its most difficult problems in maintaining good relations with its neighbors to the south.

The Latin American argument runs somewhat as follows: "Foreigners have been getting the best out of our land for centuries. They have grown rich by exploiting our resources and our people. The time has come to readjust the situation. Social justice for millions is more important than profits for a few. Natural resources such as oil belong of right to the nation itself. They should be used to build schools, roads, and health for our own people and not to enrich outsiders."

The foreign investor argues: "We foreigners were invited to invest our money in your country. We have a right to expect that our property will be protected by law. We pay better wages than your own nationals do. We pay taxes without which the government could not carry on its program. If you do not protect foreign capital, we will lose confidence in your country and cease our investments. Without foreign capital, your country will not develop and your trade will be stifled."

Until about the 1930's the United States government took the side of the foreign investors. But today the government seeks a policy that will be fair to both the investors and to the national needs of Latin America. It tries to get the investors and the Latin governments to adjust their differences by negotiation. Inter-American Conferences have also taken up this critical economic problem.

This problem is only one of the many that the people of the United States and of Latin America have to solve if they are to unite in their friendly development of the Western Hemisphere.

Relations Between the American Republics

WHEN LATIN AMERICA started its independent existence, it extended all the way from Oregon to Cape Horn. The United

States began with only a thin line of territory on the Atlantic coast. Soon it began to grow—largely at the expense of Latin America. It gained Florida, the enormous Louisiana Territory, and Texas. Then it took a mighty jump to California. Before the war with Mexico (1846–48) the Latin Americans looked upon the United States as "the great sister nation of the North." But after the war they began to suspect and fear it. After the Spanish-American War (1898)

the United States further enlarged its possessions by taking Puerto Rico and the Canal Zone. By the Platt Amendment it assumed the right to intervene in the affairs of Cuba. After the building of the Panama Canal, the United States began the practice of intervening—sending armed forces to settle internal quarrels—in the countries around the Caribbean Sea. It was then that the people to the south gave it a new name, the "octopus of the north." After each of these interventions, great parades of students would march through the streets of Latin American capitals protesting against "Yankee imperialism."

This fear and suspicion continued to increase until 1933, when the United States signed a treaty with Latin American countries agreeing that "no state has the right to intervene in the internal or external affairs of another." This was the "good neighbor policy" and marked the beginning of a fundamental change in Pan American relations.

Pan American Conferences

The agreement not to intervene in one another's affairs was signed at the seventh Pan American conference, at Montevideo in 1933. These conferences, officially called International Conferences of American States, have had two main purposes: first, the peaceful settlement of all disputes arising between the republics of America; second, the encouragement of inter-American commerce and the strengthening of both commercial and cultural ties. As early as 1826 the great South American patriot, Simón Bolívar, called a conference of the American republics to assemble at Panama. Only four countries were represented. The United States appointed delegates, but too late to be represented. Although no decisions of great importance were reached at this conference, it was the first move in forming the close ties that now link the American republics.

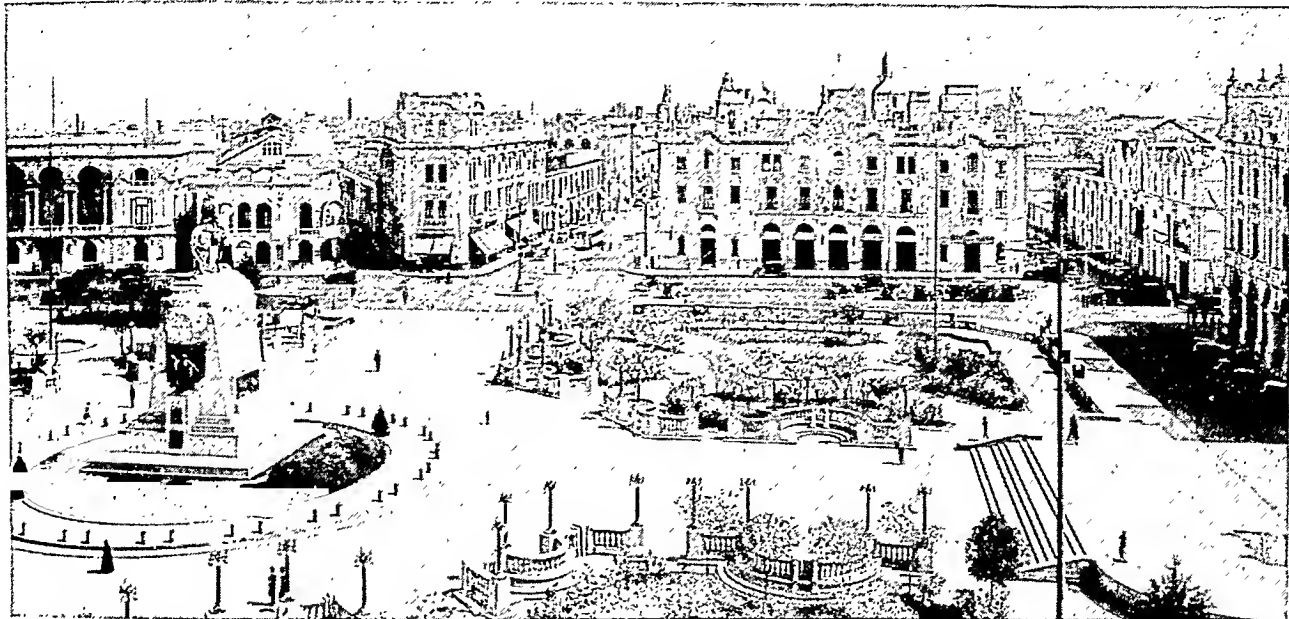
The Pan American movement received its clearest expression at the First International Conference of American States, which met at Washington in 1889. This conference was called on the initiative of James G. Blaine, who was secretary of state in President Benjamin Harrison's administration and who is sometimes called the "father of Pan Americanism." Its chief accomplishment was to set up a bureau which later became the Pan American Union.

The second conference was held in Mexico City in 1901–02. The third met in Rio de Janeiro in 1906; the fourth, in Buenos Aires in 1910; the fifth (delayed by the first World War), in Santiago in 1923; the sixth, in Havana in 1928. As a result of these meetings a number of treaties relating to economic and political questions were signed. But their usefulness was always limited by the intervention policy of the United States.

The Good Neighbor Policy

At the seventh conference at Montevideo in 1933, the United States reversed this policy. Secretary of State Cordell Hull, who headed the United States delegation, announced that intervention would cease.

WHERE 21 REPUBLICS AFFIRMED THEIR UNITED INTERESTS



At Lima, the ancient capital of Spanish America, and today the capital of Peru, the eighth Pan American conference met in 1938. This is the Plaza San Martín in the center of the city, dedicated to a hero who helped to free Latin America from European bondage.

He declared that his government did not represent the bankers, nor would it push the collection of debts. He further proposed that the American countries should set an example to the world by lowering tariffs. This should be done by reciprocal trade agreements between two or more countries, with the "most favored nation clause"—that is, that favors agreed upon by any two nations should be open to all other nations on the same basis. Within a few years such treaties were signed with a majority of the American countries.

The "good neighbor policy" bore important fruits in succeeding conferences. A special Inter-American Conference for the Maintenance of Peace was called by President Franklin D. Roosevelt to meet at Buenos Aires Dec. 1, 1936. President Roosevelt himself opened the conference with an address which notably strengthened Latin American faith in democracy. Building on the newly acquired confidence in the United States, the American nations agreed to consult together if the peace of this hemisphere were threatened either by an attack from the outside or by a quarrel between American countries. Several treaties were signed which added to the development of peaceful relations in the New World.

Declaration of Lima

Two years after the Buenos Aires gathering, the eighth Pan American conference met at Lima, Dec. 9, 1938. When the delegates gathered, one question overshadowed all others: What was to be the attitude of the American Continent toward nations that threatened it from the outside? Three totalitarian states, Germany, Italy, and Japan, had recently developed their propaganda to an alarming extent. Americans, North and South, were anxiously asking whether the propaganda of the fascist states had won any of the American republics to the totalitarian idea. On the last day of the conference—appropriately on

Christmas Eve—a great historical document known as the Declaration of Lima was adopted. Its preamble and five declarations affirmed the unity of the American Continent and committed the twenty-one governments to stand solidly together in defending their republican institutions against all outside attacks.

American Solidarity in the Face of Europe's War

A world crisis soon tested this new unity. When war broke out in Europe in September, 1939, the foreign ministers of the twenty-one nations met in the city of Panama to take steps to protect American neutrality. Chief of the measures adopted was the Declaration of Panama, which established a "zone of security" around the Americas south of Canada. Within this zone, averaging 300 miles wide, the warring nations of Europe were asked to avoid all hostile acts.

The Panama conference also set up a committee to recommend measures for economic and financial cooperation which would increase trade among the American nations and thus offset the loss of European markets. A second committee undertook to formulate proposals for safeguarding American neutrality.

Monroe Doctrine Now a Pan American Policy

A second meeting of American foreign ministers opened in Havana, July 21, 1940, in an atmosphere even more tense than that of the Panama conference. Now that France and the Netherlands had been defeated by German arms, the danger arose that Germany would gain possession or control of French and Dutch territories in the Americas. To avert such action, the foreign ministers adopted the Act of Havana, whose terms may be summarized as follows:

1. The nations expressed unanimous opposition to the transfer of any European possessions in the Western Hemisphere to the control of another non-American power.

2. If such a transfer seemed imminent, the American nations would establish a provisional administration over the threatened region. This administration would govern the

territory until it was considered capable of governing itself or until it was restored to its former status. The provisional administration would be established by an Inter-American Commission of Territorial Administration, composed of one representative of each of the ratifying states.

Under the Act of Havana the defense of the New World from aggression by Old World powers became the unified policy of the American republics, replacing, in a sense, the Monroe Doctrine, under which the United States alone had assumed responsibility for preventing foreign interference (*see* Monroe Doctrine).

North and South Unify in Second World War

When the United States went to war in December 1941, most Latin American republics cooperated immediately. Some declared war on the Axis at once; others broke diplomatic relations with the Axis. Nearly all the republics built naval and air bases for joint use. Lend-lease funds from the United States helped to pay for the bases and to modernize Latin American armies. Mexico and Brazil sent expeditionary forces overseas. United States and Latin American agencies aided the republics to increase production of strategic war materials, chiefly food and minerals.

Argentina refused to depart from its position of neutrality or to break diplomatic ties with the Axis until January 1944. Even after this it was accused by the Allies of being the headquarters for the activities of enemy agents. Most of the American nations refused to recognize the military government which took power there in February. Argentina's request for a meeting of foreign ministers to consider its "alleged failure to fulfill its obligations" was refused by the Pan American Union. The next meeting of foreign ministers at Chapultepec Castle in Mexico City in February 1945 was limited to American nations collaborating in the war effort, thus barring Argentina.

The Act of Chapultepec

The Act of Chapultepec went further toward full inter-American cooperation than had any previous compact. The republics agreed to defend one another against aggression from any nation, including any American nation. They agreed to consult among themselves before taking political, economic, or military measures against an aggressor, thus forbidding unauthorized reprisals by any single nation.

The Latin American nations and the United States worked in general accord to help create the United Nations in the spring of 1945. Against the opposition of Russia they obtained United Nations membership for Argentina, which had belatedly declared war on the Axis and accepted the Act of Chapultepec. In 1947 the United States and Latin America met in the "Rio Conference" at Petropolis, Brazil, and made the Act of Chapultepec a permanent treaty within the terms set by the United Nations. This conference also made a formal treaty of the Act of Havana.

Coöperate in Economics, Health, Education

After the second World War the United States and most of the republics resumed their cooperative work to improve agriculture, industry, trade, health, and living standards in parts of Latin America. The Export-Import Bank in Washington made loans to the

republics to develop resources. In 1940 President F. D. Roosevelt had set up the Office of Coördinator of Inter-American Activities. This gave way to the Institute of Inter-American Affairs, incorporated by Congress in 1947 and extended into 1955.

The Inter-American Institute of Agricultural Sciences was built at Turrialba, Costa Rica, for research in farming and stock raising under supervision of experts from the United States. The United States also contributed to the republics' coöperative program to improve public health. The Inter-American educational program included exchanging teachers and students. Latin American students received jobs in the United States while they learned modern techniques in farming, industry, and transportation.

Results of the Bogotá and Carácas Conferences

The Ninth Inter-American Conference at Bogotá, Colombia, in 1948 put the principles of inter-American coöperation into treaty form. Representatives of the 21 republics founded and chartered an "Organization of American States" to serve as a regional agency within the United Nations.

An economic agreement to encourage private foreign investments favored prompt repayment of a fair price when a nation expropriated foreign property. The delegates adopted a resolution that a state exists politically regardless of recognition by other nations.

At a meeting of foreign ministers in Washington, D. C., in 1951, resolutions called for solidarity in hemispheric defense against international Communism. The Tenth Inter-American Conference in Carácas, Venezuela, in 1954 resolved that domination of the political institutions of any American state by the international Communist movement would constitute a threat and call for consultation and action under existing treaties. An investigating mission was sent to Guatemala where a Communist-dominated government was overthrown in 1954.

The Organization of American States

ESTABLISHED in 1948 to maintain peace and promote human welfare through the joint solution of hemispheric problems, the Organization of American States seeks to accomplish its purposes by means of six agencies. They are: (1) the Inter-American Conference, (2) the Meeting of Consultation of Ministers of Foreign Affairs, (3) the Council, (4) the Pan American Union, (5) specialized conferences, (6) specialized organizations.

The supreme authority of the OAS is the Inter-American Conference. It meets every five years to decide general policy and to consider matters relating to friendly relations among the American republics. Meetings of consultation of the foreign ministers may be called on urgent problems. In case of armed attack or a threat to the peace of a nation, the meeting plans joint defense measures. An Advisory Defense committee, made up of military authorities of the member nations, aids in obtaining military coöperation. The council is in continuous session at the headquarters of the Pan American Union in Washington, D. C.

Its membership consists of one appointed representative for each state with the rank of ambassador. Though it continues many functions formerly held by the governing board of the Pan American Union, its powers are greater. It has authority to handle problems of inter-American relations between sessions of the conferences. It directs and co-ordinates the specialized organizations and the PAU and it conducts relations with the United Nations.

Agencies of the council are: the Inter-American Economic and Social Council; Inter-American Council of Jurists; and Inter-American Cultural Council. All member states are represented.

Pan American Union

The Union became the general secretariat for the OAS 58 years after the first International Conference founded it on April 14, 1890, as a bureau of commercial information. It was supervised by the United States secretary of state until 1902, when a governing board of the nations' diplomatic representatives was formed. Pan American Day is observed each year on April 14. As secretariat for the OAS, the Union keeps records and makes reports for the conferences and the council. It assists in preparing programs and assembling data for their meetings and serves as a depository for documents of ratification.

It supplies information about the Americas to the governments and the public. It publishes pamphlets and issues a monthly magazine, *Américas*, and a quarterly publication, *Annals of the Organization of American States*. These are printed in English, Spanish, and Portuguese.

Specialized conferences are called to handle some specific phase of inter-American co-operation, such as sanitation, science, or highways. The specialized organizations include official bodies, such as the Pan American Sanitary Bureau, and semiofficial groups, such as the Pan American Coffee Bureau.

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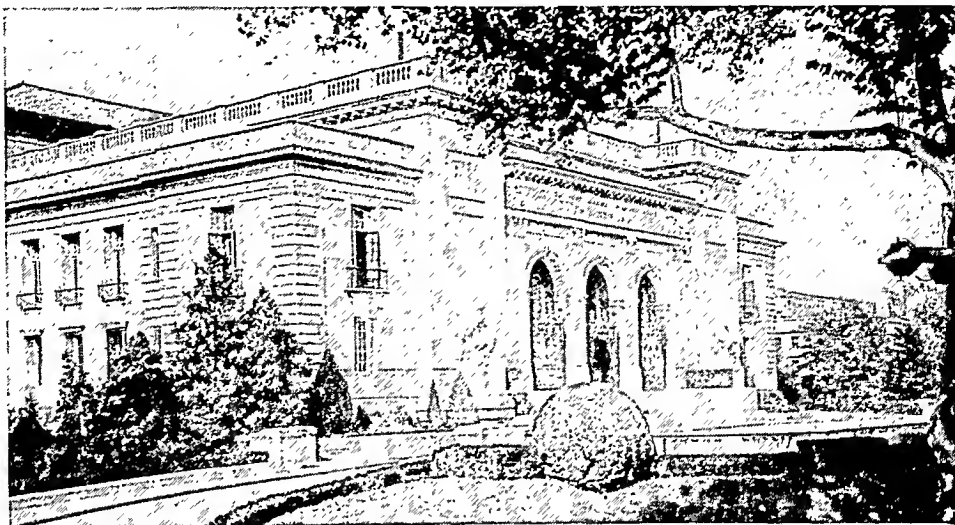
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FOUR CENTURIES of *Literature* in LATIN AMERICA

LATIN AMERICAN LITERATURE. The literature of Latin America is older than that of the United States. Education and the arts flourished in Mexico and Peru while New England was still a wilderness. The first book published in America was printed in Mexico City about 1539, more than 80 years before the Pilgrims landed on Plymouth Rock.

In many respects the literature of Latin America is very different from that of the United States. It is written in Spanish, Portuguese, and French. Its backgrounds are the high Andes, the steaming jungles of the Amazon, or the Argentine Pampa. Its characters are the descendants of the Spanish conquistadors, the half-tamed Indians of the jungle, or the picturesque *gauchos* (cowboys) of the South American plains.

But in spite of these differences the literatures of North and South America have something in common. Latin America, like the United States, is a new world. Its writers use the language of ancient Spain or Portugal, as writers in the United States use the language of old England. But in both cases the old tongue is used to describe new scenes, to picture new ways of life, to express new points of view.

The Colonial Period

At the beginning there was little in this literature that was American. Many books were written in Latin America during the colonial period. But they were simply Spanish or Portuguese books which happened to be written in America. The poets and historians who clustered around the magnificent vice-regal courts at Mexico City and Lima were bound by the rigid traditions of the Old World.

Some of the histories were written by the priests who came to America with the conquistadors. The most famous of the historian-priests was Fray Bartolomé de las Casas (*see Las Casas*). His 'Historia de las Indias' was a plea for better treatment of the natives. Another interesting historical work was the 'Comentarios Reales' of Garcilaso de la Vega. This writer's mother was an Inca princess. His book gives a picture of the Spanish conquest from the native point of view.

Epic poems about the heroic deeds of great soldiers and grandees were popular in Spain at this time. The taste spread to the Spanish colonies in America. A poem of this sort, 'La Araucana', published in 1569 by Alonso de Ercilla y Zúñiga, has been called the first important literary work to be written in America. It is based on the author's personal adventures and tells of the wars between the Spaniards and the Araucanian Indians in what is now Chile. This has become almost the national poem of Chile.

The Stimulus of Independence

The colonial period ended about 1810. The ideas of liberty and democracy, which had already brought about the American and French revolutions, began to penetrate into Latin America. Between 1810 and 1826

one colony after another gained independence. Finally only Cuba and Puerto Rico were left to Spain. In this period of disorder and warfare, patriotic poets sang of freedom and of the great deeds of the liberators, Bolívar and San Martín. This verse was inspiring at the time, but most of it cannot be called good poetry. The fighters for liberty had little time for literature.

Brazil was the only exception. Brazil belonged to Portugal, not to Spain, and it won independence without fighting for it. The Brazilians, therefore, had more leisure to cultivate the arts. For much of this period Rio de Janeiro was the cultural center of Latin America.

Independence gave a new impetus to literary activity and inspired the beginnings of national literatures. Freed from Spanish and Portuguese domination in culture as in government, writers turned elsewhere for inspiration and leadership. Most of them looked to France. They read Victor Hugo and the other French writers of the romantic school. Adopting a romantic style themselves, they filled their poetry with sentimental emotion. More than ever before they wrote on American subjects; but the French influence meant that they were still looking at America through European eyes.

The four outstanding writers of this period were José Joaquín de Olmedo (Ecuador), Andrés Bello (Venezuela-Chile), José María Heredia (Cuba), and Olegario Víctor Andrade (Argentina). Bello was less of a romantic than the others. He believed in the old Spanish classicism.

To these four great names may be added that of José Hernández. His poem 'Martín Fierro' was in a sense the first really American book to appear in Latin America. It is a long narrative poem of the *gauchos* of the Argentine Pampa. It is still widely read, but it is chiefly important as the first example of native American literature.

The Modernist Revolt

The romantic period ended in 1888. In that year the Nicaraguan writer Rubén Darío published his book 'Azul'. This marked the beginning of what is known as the *Modernista*, or modernist, movement. This was a revolt both against romanticism and against the dominance of Europe.

The modernists introduced a new clearness, simplicity, and beauty into the writing of prose as well as poetry. Freedom and individualism took the place of the old, blind copying of European models. They became conscious of the fact that they were living in a new world and creating a new literature. They wrote now from within America. And it was the American continent they saw, not any one country. Many of them began to preach the ideal of Pan Americanism. But most of them were suspicious of the United States. They feared the power of the "Colossus of the North." Their Pan Americanism included only Latin America.

Such poets as Rubén Darío, Amado Nervo, Enrique González Martínez, José Santos Chocano, José María Eguren made modern Latin American poetry both individualistic and truly American.

Essayists and Historians

The essayist is second only to the poet in popularity in Latin America. The people of these countries are passionately interested in ideas. A best seller there

elists like the Mexican Mariano Azuela are describing the life of the Mexican peon and soldier in the turbulent period of revolution through which the country is passing. José Eustacio Rivera wrote of the cruel struggle for existence in the dreadful jungles of the Amazon. Ricardo Güiraldes and Rómulo Gallegos have pictured the simple lives of the gaucho on the Argentine Pampa and the rider of the Venezuelan

THEY HELPED TO LIBERATE THEIR LITERATURE FROM EUROPEAN DOMINATION



Heredia



Olmedo



Bello



Andrade

is more likely to be a book on some historical, social, or political subject than a novel.

Bartolomé Mitre, Domingo Faustino Sarmiento, Juan Bautista Alberdi, Juan Montalvo, Ricardo Palma, Manuel González Prada, Francisco García Calderón, José Enrique Rodó—these are some of the outstanding essayists and historians.

Development of the Novel

Novels have been written in Latin America for many years. But the novels too, except for their subjects, were for a long time more European than American. And the novelists were completely overshadowed by the poets. José Mármol's 'Amalia', published in 1855, was the first notable South American novel. It is an old-fashioned story of events in Argentina in the first years of independence, under the tyrant Rosas. South America's other outstanding 19th-century novel was Jorge Isaacs' 'María'. This is a tale of life on a Colombian plantation. But, apart from its setting, it is just a sentimental love story.

The modern Latin American novel began to appear about the beginning of the present century. The growth of cities and the spread of education were opening up a whole new public for books. This public found novels much easier reading than poetry. The result was almost a literary revolution.

The outstanding characteristics of the modern Latin American novel are its vitality and its variety. It is real literature, for most Latin American writers are fine craftsmen. They have discovered the fascinating country which is all about them. They have discovered the inarticulate and neglected Indians and mestizos who make up the mass of their people. They have become aware of the problems of these people. These novels therefore have social importance. Nov-

llanos. The Latin American novel promises to be one of the Western Hemisphere's greatest contributions to world literature.

Summary by Countries

All Latin American writers continued to have a great deal in common even after the colonies became independent. But certain distinctive qualities appeared in the different republics. The paragraphs which follow suggest the special features and name the chief writers of each.

ARGENTINA

Argentina has contributed many names to all branches of literature. Olegario Víctor Andrade was its greatest poet. His patriotic, somewhat flamboyant, verses on the glory of Latin America won him much popularity. Three of Latin America's most noted political essayists and historians were Argentinians: Bartolomé Mitre, Domingo Faustino Sarmiento, and Juan Bautista Alberdi.

Carlos María Ocantos is generally considered to be the greatest of Argentine novelists. He wrote a long series of connected stories about life in Buenos Aires, a series somewhat like Balzac's 'Human Comedy'.

The most original part of Argentine writing is its poetry and fiction about the gaucho and his life on the great plains (Pampa). This subject was first used by José Hernández in his narrative poem 'Martín Fierro'. Among the many novels which have been written on this theme, Ricardo Güiraldes' 'Don Segundo Sombra' is notable. Argentina's chief writers are: Esteban Echeverría (1805-1851)—'Las Rimas'. Juan Bautista Alberdi (1810-1884)—'Bases y Puntos de Partida para la Organización Política'. Domingo Faustino Sarmiento (1811-1888)—'Facundo, o la Civilización y la Barbarie'. José Mármol (1818-1871)—'Amalia'.

Bartolomé Mitre (1821-1906)—'La Historia de San Martín'.
 José Hernández (1834-1886)—'Martín Fierro'.
 Olegario Víctor Andrade (1841-1882)—'Atlántida, Canto al
 Porvenir de la Raza Latina en América'; 'Prometeo'.
 Carlos María Ocantos (1860-1949)—'León Zaldívar'; 'Don
 Perfecto'.
 Ricardo Rojas (born 1882)—'El Cristo In-
 visible'.
 Hugo Wast (Gustavo A. Martínez Zuviría)
 (born 1883)—'El Desierto de Piedra'.
 Ricardo Güiraldes (1886-1927)—'Don Segundo
 Sombra'.
 Victoria Ocampo (born 1891)—'Testimonios'.

BOLIVIA

Only about 15 per cent of Bolivia's population is white; few of the Indians can read or write; and Bolivia is geographically isolated high up in the Andes. These circumstances have hampered its literary development. Benjamín Lenz, Nestor Galindo, and Daniel Calvo were poets of the romantic school. The modernist poet Ricardo Jaimes Freyre was born in Bolivia, but lived for most of his life in Argentina and did much of his work there. Rosendo Villalobos is the best known of contemporary Bolivian poets. Here is a list of the works by these writers:

Nestor Galindo (1830-1865)—'Lágrimas'.
 Daniel Calvo (1832-1880)—'Melancolía'; 'Rimas'.
 Benjamín Lenz (1836-1878)—poems.
 Rosendo Villalobos (born 1859)—'Tic-Tac, a mi Reloj'.
 Ricardo Jaimes Freyre (1870-1933)—'Castalia Bárbara y
 Otros Poemas'; 'Los Conquistadores'.

BRAZIL

The first Brazilian books were descriptions of the country and its native Indians. Then came the poets, most of them imitating the great Portuguese poet Camoens. The greatest of Brazilian poets was Antonio Gonçalves Dias, who introduced what is known as "Indianism" into his country's literature. Dias had Indian and Negro blood as well as Portuguese. For this reason he may be considered truly representative of the great racial melting-pot which is Brazil.

Brazil has also produced a number of fine novelists. Brazilians were writing truly American, truly Brazilian, novels before the rest of Latin America turned to native subjects. Two outstanding novelists were the Visconde Escagnolle de Taunay and Euclides da Cunha. Both of these men wrote of the *sertões*, the wild hinterland in the interior of Brazil. Among Brazil's chief writers are:

Antonio Gonçalves Dias (1823-1864)—'Poesías Americanas'.
 José Martiniano de Alencar (1829-1877)—'O Guarany'.
 Joaquim Maria Machado de Assis (1839-1908)—'Yayá
 Garcia'; 'Memorias Posthumas de Braz Cubas'.
 Alfredo Escagnolle de Taunay (1843-1899)—'Innocencia'.
 Manuel de Oliveira Lima (1865-1928)—'Dom João VI no
 Brazil'.
 Euclides da Cunha (1866-1909)—'Os Sertões'.

CHILE

Chile's most distinguished writers are historians and biographers like Benjamín Vicuña Mackenna, Diego Barros Arana, and Miguel Luis Amunátegui. The best novelists are Alberto Blest Gana, who wrote

about social conditions in the country, and the historical novelist Daniel Barros Grez.

Chile's greatest poet was not a Chilean. Andrés Bello was a Venezuelan who did not move to Chile

until he was 48 years old, but who did his best work after that time. Bello was a remarkable man. He was a noted lawyer and educator, as well as a poet. He worked with Bolívar during the wars of independence and served afterward as first rector of the University of Chile. In the top rank among contemporary Latin American poets is Chile's Gabriela Mistral, Nobel Prize winner for 1945, who writes simple melancholy verses. Here is a list of the works by Chilean writers: Alonso de Ercilla y Zúñiga (1533-1594)—'La Araucana'.

Andrés Bello (1781-1865)—'Silvas Americanas'; 'Gramática Castellana'.

Miguel Luis Amunátegui (1828-1888)—biographies.
 Diego Barros Arana (1830-1907)—'Historia General de Chile'.

Benjamín Vicuña Mackenna (1831-1886)—histories, biographies.

Alberto Blest Gana (1831-1920)—'Martín Rivas'.
 Daniel Barros Grez (1834-1904)—'Pipiolos y Pelucones'.
 José Antonio Soffia (1843-1884)—'Bolívar y San Martín'.
 José Toribio Medina (1852-1930)—bibliographic works.
 Eduardo Barrios (born 1884)—'El Hermano Asno'.
 Gabriela Mistral (Lucila Godoy Alcayaga) (born 1889)—'Desolación'.

COLOMBIA

Colombians like to call their capital Bogotá the "Athens of America." Even the politicians in this republic are likely to be poets, and the poets often become politicians.

José Asunción Silva's nobly pessimistic voice inspired Rubén Darío and thus helped to launch the modernist movement. Among Colombia's other great poets were José Eusebio Caro, who has been called the "Puritan of South American literature," and Julio Arboleda, who mixed poetry with politics and died at the hands of an assassin. The austere Guillermo Valencia is an important recent poet.

'María', a sentimental description of life on a Colombian plantation, by Jorge Isaacs, was one of South America's first notable novels. José Eustacio Rivera's 'La Vorágine', a novel of the Amazonian forest, ranks high in the new school of native fiction. Among Colombia's chief writers are:

Eugenio Díaz Castro (1804-1865)—'Manuela'.
 José Eusebio Caro (1817-1853)—poems.
 Julio Arboleda (1817-1862)—poems.
 Gregório Gutiérrez González (1826-1872)—poems.
 Jorge Isaacs (1837-1895)—'María'.
 José Asunción Silva (1865-1896)—poems.
 Guillermo Valencia (1873-1943)—poems.
 José Eustacio Rivera (1889-1928)—'La Vorágine'.

COSTA RICA

A great deal of poetry is written in the five small republics of Central America, but little of it is ever heard of in the outside world. When a good poet appears, he is likely to seek broader opportunities in



GABRIELA MISTRAL

larger countries. This is true even of Costa Rica, whose orderliness and high degree of literacy are in marked contrast with the turbulency of its little neighbors. Emilio Pacheco Cooper (born 1865), Carlos Gagini (1865–1929), and Rafael Machado Jáuregui (1834–?) are probably the best known Costa Rican poets. Aquileo J. Echeverría (1866–1909) attracted some attention among the modernists.

CUBA

Cuba's long continued servitude to Spain and its struggle for freedom have colored much of its poetry. The best Cuban poet, and one of the finest that Latin America has produced, was José María Heredia. Heredia's life was a short one (he died at 36) and he spent part of it in unhappy exile in the United States. But he had time to write many splendid poems of nature and of patriotism. The revolutionary leader José Martí also wrote poetry, but he is better known for his brilliant and eloquent prose.

Cuba's best-known woman poet, Gertrudis Gómez de Avellaneda y Arteaga, was not, like most of her fellows, a revolutionary. She lived most of her life in Spain, where she devoted herself to writing lyric poems and poetic dramas. Here is a list of Cuba's chief writers and their works:

- José María Heredia (1803–1839)—poems.
 Gertrudis Gómez de Avellaneda y Arteaga (1814–1873)—*'Baltasar'*; *'Saul'*; *'Alfonso Múñio'*.
 Juan Clemente Zenea (1832–1871)—*'Cantos de la Tarde'*.
 José Martí (1853–1895)—poems, essays, speeches.
 Julián del Casal (1863–1893)—poems.

DOMINICAN REPUBLIC

The small and turbulent Dominican Republic which shares with Haiti the Caribbean island of Hispaniola, has a notable literary record.

The country has produced one remarkable literary family. Doña Salomé Ureña de Henríquez was a distinguished poet, an educator, and a leader of Dominican intellectual life. She married Francisco Henríquez, also a writer, who was at one time president of the republic. Their sons, Pedro and Max Henríquez Ureña, became two of the outstanding figures in their country's later literary history.

The great Puerto Rican thinker and educator Eugenio María de Hostos spent much time in the Dominican Republic. The Henríquez family helped him to introduce new educational methods there. They and their friends established one of the most fruitful intellectual movements in Latin America. The best-known writers include the following:

- Felix María del Monte (1819–1899)—poems.
 Manuel de Jesús Galván (1834–1911)—*'Enriquillo'*.
 José Joaquín Pérez (1845–1900)—*'Fantasías Indígenas'*.
 Salomé Ureña de Henríquez (1850–1897)—poems.
 Fabio Fiallo (born 1865)—poems.
 Pedro Henríquez Ureña (1884–1946)—*'El Nacimiento de Dionisos'*; *'Antología Dominicana'*.
 Max Henríquez Ureña (born 1885)—poems, literary history.

ECUADOR

Ecuador contributed to Latin American literature one of the first and greatest of its modern poets. José Joaquín de Olmedo fought with Bolívar for the inde-

pendence of South America. After the battles of Junín and Ayacucho, which broke the Spanish power in the northern part of the continent, he wrote *'La Victoria de Junín, Canto a Bolívar'*. The keynote of this fine rhetorical poem was patriotism and Pan American unity. Olmedo, unlike many Latin American poets, included the United States as well as Latin America in his Pan Americanism. Ecuador has produced other good writers but Olmedo overshadows them all. Among its chief writers are:

- José Joaquín de Olmedo (1780–1847)—*'La Victoria de Junín, Canto a Bolívar'*.
 Numa Pompilio Llona (1832–1907)—*'Los Caballeros del Apocalipsis'*; *'La Odisea del Alma'*.
 Juan León Mera (1832–1894)—*'Cumandá'*; *'La Virgen del Sol'*.
 Juan Montalvo (1832–1889)—*'Siete Tratados'*.
 Víctor Manuel Rendón (1859–1940)—*'Obras Dramáticas'*.

GUATEMALA

There are four outstanding figures in Guatemalan literature. Although Antonio José de Irisarri was active in the revolution against Spain and later held many public offices, his pen was never idle. He wrote verse, political articles, and essays on grammar and philology. José de Batres y Montúfar was a poet whose best-known work *'Tradiciones de Guatemala'* consists of three humorously scandalous stories told in verse. Juan Diéguez y Olaverri was a popular poet of the romantic period. José Milla y Vidaurre (Salomé Gil), historian and novelist, was Guatemala's outstanding prose writer. Here is a list of the works by these writers:

- Antonio José de Irisarri (1786–1868)—*'Poesías Satíricas y Burlescas'*; *'Cuestiones Filológicas'*.
 José de Batres y Montúfar (1809–1844)—*'Tradiciones de Guatemala'*.
 Juan Diéguez y Olaverri (1813–1866)—*'Las Tardes de Abril'*; *'A la Independencia'*; *'La Garza'*.
 José Milla y Vidaurre (Salomé Gil) (1827–1882)—*'Historia de la América Central'*; *'Don Bonifacio'*.

HAITI

Haiti, which shares the storied island of Hispaniola with the Dominican Republic, is a Negro republic whose people speak French. The bulk of the Haitians are miserably poor and ignorant. But the small ruling class is highly cultured, and Haiti has many poets, writing like Frenchmen, yet with a strong strain of Africa in their work. An anthology of Haitian prose and poetry was awarded a prize some years ago by the French Academy, but the work of Haitian writers is little known outside of their own country. The republic's chief claim to literary fame is probably the fact that Alexandre Dumas, the great French novelist, was of Haitian parentage. Its best-known writers are Démesvar Delorme (1833–?), Frédéric Marcelin (born 1852), George Sylvain (born 1866), Massillon Coicou (born 1867), and Léon Laleau.

HONDURAS

Honduras is another Central American republic with a sparse literary product. Alberto Membreño (1859–1921), politician, diplomat, scholar, is the commanding figure in Honduran letters. José Cecilio del Valle (1780–1834), the scholar José Trinidad Reyes

(1797–1855), the orator Ramón Rosa (1848–1893), and the poet Juan Ramón Molina (1875–1908) are other leading writers.

MEXICO

Mexico has one of the oldest, richest, and most varied of Latin American literatures. It stretches from the songs of the 17th-century nun, Sor Juana Inés de la Cruz, to today's revolutionary social novelists. There is an undertone of sadness in almost all Latin American literature. But this is particularly marked in Mexican writing. It comes partly from the strong Indian strain. The mingling of white and Indian blood has come closer in Mexico than anywhere else in America to creating a new race.

The most important of Mexico's poets in the romantic period were the poetic dramatist Ignacio Rodríguez Galván and the sonneteer Manuel José Othón. The musical and melancholy Manuel Gutiérrez Nájera also wrote in this period. But he wrote with more grace and lightness than most of the romantics. He was really a forerunner of the modernists. One of the greatest of the modernists, Amado Nervo, was also a Mexican. Nervo wrote simple, tender songs of great freshness and beauty.

Mexico has a long list of novelists, too. But its most important fiction has sprung up since 1912, when the Mexican revolution began. Such men as Mariano Azuela, Martín Luis Guzmán and Gregorio López y Fuentes are writing vividly of the revolution and of the life of the humble peons who are still fighting that revolution. Mexico's best-known writers are:

Juana Inés de la Cruz (1651–1695)—'Inundación Castálida'. Justo Sierra (1814–1861)—'La Hija del Judío'. Ignacio Rodríguez Galván (1816–1842)—'Múñoz'; 'Visitador de México'.

Rafael Delgado (1853–1914)—'Angelina'; 'Calandria'.

Salvador Díaz Mirón (1853–1928)—poems.

Manuel José Othón (1858–1906)—'Noche Rústica de Walpurgis'; 'Sinfonía Dramática'.

Manuel Gutiérrez Nájera (1859–1895)—'Para Entonces'.

Federico Gamboa (1864–1929)—'Suprema Ley'.

Amado Nervo (1870–1919)—'Epitalamio'.

Mariano Azuela (1873–1953)—'Los de Abajo'; 'Marcela'.

Martín Luis Guzmán (born 1890)—'El Águila y la Serpiente'; 'La Sombra del Caudillo'.

Gregorio López y Fuentes (born 1897)—'El Indio'.

NICARAGUA

Nicaragua has produced only one writer of consequence. But Rubén Darío (1867–1916) was a writer great enough to assure literary immortality to any country. The founder of the modernist movement was a child prodigy. He could read when he was three years old. At 13 he was writing poetry for the newspapers. His unhappy childhood and the unfortunate love affairs of his later wandering life left their marks on his prose and poetry. He created a new style and turned the whole course of Latin American literature in a new direction. His chief works are 'Azúl', 'Prosas Profanas', and 'Cantos de Vida y Esperanza'.



RUBÉN DARÍO

PANAMA

Panama has been a separate country for less than 30 years. Before that it was part of Colombia. It may therefore be given a share in Colombian literature. It has not had time to develop a national literature of its own.

PARAGUAY

Paraguay is in much the same situation as Bolivia. It is largely Indian in population and even more isolated than Bolivia. It has been engaged in an almost continuous series of wars since it became independent. Thus it has contributed little to literature. During the past few years Juan E. O'Leary (born 1880) has been writing history and Juan Stefanich (born 1889) poetry, while Juan Natalicio González has produced the nationalistic, anti-imperialistic work, 'Paraguay Heroico'.

PERU

The most noted of Peruvian prose writers was Ricardo Palma. He created what was almost a new type of literature. The nine volumes of his 'Tradiciones Peruanas' are a mixture of history and fiction. They are made up of tales and anecdotes from Peruvian history, many of them amusing, all of them delightfully written. Unlike most Latin Americans, Palma was a cheerful writer.

José Santos Chocano, Manuel González Prada, and José María Eguren are the outstanding names in Peruvian poetry. Chocano was second only to Darío among the great modernists. Among the modern prose writers are Francisco García Calderón, brilliant historian and political essayist, and José Carlos Mariátegui, one of South America's leading radical authors. Here is a list of works by Peruvian writers:

Ricardo Palma (1833–1919)—'Tradiciones Peruanas'.

José Santos Chocano (1875–1934)—'El Canto del Porvenir'.

José María Eguren (born 1882)—'Poesías Simbólicas'.

Francisco García Calderón (born 1883)—'Hombres e Ideas de Nuestro Tiempo'; 'Profesores de Idealismo'.

Manuel González Prada (1884–1918)—'Páginas Libres'.

José Carlos Mariátegui (1885–1930)—'La Escena Contemporánea'.

EL SALVADOR

El Salvador has had two poets who deserve mention. Juan José Bernal (born 1841–?) was a mystic nature-poet. Juan José Cañas (1826–1900) sang sentimental patriotic songs. Most of them grew out of his own experiences in the California gold rush and in fighting against the filibusterer William Walker.

URUGUAY

Uruguay is a small country with a rich literature. Juan Zorrilla de San Martín is the greatest of all Uruguayan poets. His best-known work is a long poem, 'Tabaré', describing the tragic love of a half-breed Indian for a Spanish girl.

Eduardo Acevedo Díaz heads the list of novelists with his pleasant romance 'Brenda' and his novels of gauchos and Indians. Carlos Reyes is the leading

modern novelist. He deals with the tragic, sordid side of Uruguayan life.

But foremost of all Uruguayan writers, known all over the world, was José Enrique Rodó, the essayist. He wrote much and brilliantly on social and political subjects. His most famous work is the slim little volume 'Ariel'. This is a message to Latin American youth which has been a bible to Spanish-speaking young people for several generations. In 'Ariel' Rodó contrasts the idealism of Latin America with the materialism of the United States. Rodó's attitude is one-sided and rather unfair. But 'Ariel' is the key to the way many Latin Americans feel about the United States. Among Uruguay's chief writers are: Alejandro Magariños Cervantes (1825-1893)—'Caramurú'. Eduardo Acevedo Díaz (1851-1921)—'Brenda'. Juan Zorilla de San Martín (1855-1931)—'Tabaré'; 'La Leyenda Patria'.

Carlos Reyles (1868-1938)—'Beba'; 'El Embrujo de Sevilla'. José Enrique Rodó (1872-1917)—'Ariel'; 'El Mirador de Próspero'.

Javier de Viana (1872-1927)—'Yuyos'.

Julio Herrera y Reissig (1875-1910)—'Los Peregrinos de Piedra'.

VENEZUELA

Venezuela was one of the first countries in which realistic novels about social and political life became popular. Early leaders of this school were Gonzalo

Picón-Febres and Manuel Díaz Rodríguez. Two of the most noted of contemporary Latin American novelists are Venezuelans. Rómulo Gallegos writes dramatic novels of the llanos. Rufino Blanco-Fombona is a poet and a vigorous critic, as well as a novelist. Here is a list of works by Venezuelan writers:

José Antonio Maitín (1804-1874)—'El Máscara'.

Juan Antonio Pérez Bonalde (1846-1892)—'Poema del Niágara'.

Gonzalo Picón-Febres (1860-1918)—'El Sargento Felipe'.

Manuel Díaz Rodríguez (born 1868)—'Idolos Rotos'.

Rufino Blanco-Fombona (1874-1944)—'La Lámpara de Aladino'; 'El Hombre de Hierro'; 'El Hombre de Oro'.

Rómulo Gallegos (born 1882)—'Doña Bárbara'; 'Pobre Negro'.

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The MOTHER-TONGUE of the CIVILIZED WORLD

LATIN LANGUAGE AND LITERATURE.

When people nowadays talk of inventing a world language, the idea sounds visionary to many of us. But such a language really existed for many centuries—from just before the dawn of the Christian era almost to our own times. This world language was Latin. It began its cosmopolitan career as a conquering

tongue by following the victorious Roman legions over Europe, Asia, and Africa, until at length it became the speech of civilization, and was spoken in one form or another from the British Isles to the Persian Gulf.

In the mouths of the unlearned and careless majority, the Latin of everyday life kept steadily changing in pronunciation, grammar, and vocabulary. Thus various dialects grew up in different localities, which in the course of a few centuries developed into the group of related tongues called the "Romance languages" (see Romance Languages). But literary Latin, which remained the language of religious and political life as well as the language of scholarship, underwent little change. In the Middle Ages scholars, priests, and statesmen could travel the length of

NO one who is ignorant of Latin can be called educated, for without it we have not complete mastery even of our own language, and the foundations of half of human knowledge are a sealed book to us. The whole structure of our civilization is based on the creations of Latin genius, which we can understand only imperfectly without knowing its language. For, to quote the eloquent words of J. W. Mackail, "It is in their literature that the inner spirit of the Latin race found its most complete expression. In the stately structure of that imperial language they embodied those qualities which make the Roman name most abidingly great—honor, temperate wisdom, humanity, courtesy, magnanimity; and the civilized world still returns to that fountain-head, and finds a second mother-tongue in the speech of Cicero and Vergil."

Europe without learning the languages of the various countries, since in every community there were sure to be men of learning who talked Latin; and state documents, as well as scientific, philosophical, and other works of scholarship were written exclusively in Latin.

Even today Latin is something of a world language, though in a

different way. One-third of the English that we write is Latin, and we can hardly speak a sentence without using some such words as "wall," "street," "city," "army," "justice," "religion," and thousands of others that we have inherited from the ancient Romans (see English Language). In the Romance languages of Europe—Italian, French, Spanish, and the like—the proportion of Latin words is even higher than in English.

In the Indo-European family of languages, Latin is a younger sister to Sanskrit and Greek. (See Language and Literature.) When Greece was creating the greatest poetry of all time, Latin was still only a dialect spoken by a few tribes in the vicinity of Rome. And it was not until the 3d century B.C. that it had been planted throughout Italy, superseding for the

most part the other Italic dialects; and not until the first century that it had been developed into a superb literary language, a marvelous instrument for prose and poetry. The Latin of this so-called Golden Age had a stateliness and an artistic finish of style that have never been surpassed in any tongue. The masters knew the limitations of their instrument. Latin was not adapted to expressing fine shades of meaning; therefore the great Roman writers strove rather for clearness and precision. It had not the variety of sound that Greek possessed through its more numerous vowels and diphthongs and its musical accent, and the monotony of Latin was further increased by the great number of long syllables. But this very monotony in the right hands gave weight and dignity, and a beautiful rhythmic cadence.

The Beginnings of Literature

Just what Latin literature might have become if it had been left to itself, as the Greek was, we shall never know. Certainly it would have been very different. Before the invasion of Greek culture that followed the Roman capture of Tarentum, the greatest of the Greek colonies in southern Italy (272 B.C.), the Romans had developed a meter of their own and the beginnings of a literary form. Their so-called Saturnian verse was apparently based upon accent as our verse forms are, and was a vigorous, rough-and-ready line capable of adaptation to a variety of poetical purposes. The Greek measures which Latin afterward imitated were based not on accent but upon long and short syllables.

In the languages of many uncivilized peoples nowadays the first written book is a translation of the Bible. In Rome the first book seems to have been a translation of the 'Odyssey'. This was made in the latter half of the 3d century B.C. by a Greek, Livius Andronicus, who was brought to Rome as a slave after the capture of Tarentum. Andronicus translated some Greek plays as well. The next poet, Gnaeus Naevius (died about 200 B.C.), went on translating or imitating Greek drama, often using subjects from Roman history and introducing allusion to contemporary politics. He made use also of the pattern given by Andronicus' 'Odyssey' to write an epic of the first Punic war. Thus, from the very beginnings Roman literature was based on Greek models.

On this foundation Quintus Ennius (239-169 B.C.), the most important Roman writer before the age of Cicero, reared the stately edifice of his 'Annales'—a tremendous epic history of the Roman state, which is unfortunately known to us by only a few fragments. In this poem Ennius remolded the still rude and clumsy Latin to fit the stately flow of the Greek hexameter verse form (see Greek Language and Literature), thus influencing the whole later history of the language. A tireless and prolific worker, Ennius also produced an astonishing number of translations from the Greek tragedy and comedy, as well as many original dramas, and other works which won for him the title "father of Roman poetry."

The first Latin writer whose works have survived in any considerable body is Titus Maccius Plautus (254?-184 B.C.), the greatest comic dramatist of Rome. Twenty of his farcical plays have been preserved more or less intact across the hazards of the centuries, making him one of the world's chief dramatic influences. His plots—which he borrowed from the later Greek comic poets—have in turn furnished a rich mine for later playwrights, including Shakespeare and Molière; and many of the stock characters of the comic stage of today are mere adaptations of the types which he took from Greek comedy.

Though Plautus got the substance of his plots and characters from Greek sources, his manner and spirit were essentially Roman. His great successor Terence, who was born about the year Plautus died, avoided as a blemish any impulse toward originality or the expression of national quality, and set himself to copy his Greek originals with slavish fidelity. There is nothing Italian about his work but the language. His merit is that he thus brought into Roman literature the Greek standards of elegance, artistic perfection, and moderation; his defect, that he "struck Latin literature at the root with the fatal disease of mediocrity." His six plays, which all survive, have served as models of classical perfection to every generation of playwrights since, and some of his exquisitely polished lines, such as *Homo sum: humani nihil a me alienum puto* ("I am a man; and I think nothing pertaining to mankind foreign to me") have passed into the currency of common speech.

In addition to these poets, we have crusty old Cato the Censor (234-149 B.C.), who was the first writer of prose history in Rome to use his native tongue, and whose published speeches Cicero sincerely admired; and Lucilius (about 180-103 B.C.), who wrote the first satires that were satires in the modern sense of witty social criticism. These are all the names we need to remember from the early period of Latin literature.

The Golden Age

The Golden Age, as we call the period when Latin literature reached its greatest splendor, covers about a century (80 B.C.-14 A.D.), from the beginning of Cicero's rise as an orator to the death of the Emperor Augustus, under whose patronage arts and letters flourished as never before in Italy. Cicero brought Latin prose as an instrument for oratorical, philosophical, literary, and epistolary expression to such a pitch of perfection that the adjective "Ciceronian" is a synonym for "classically perfect," "polished," (see Cicero). A leading modern critic of Latin literature, J. W. Mackail of Oxford University, once wrote: "Cicero's unique and imperishable glory is that he created a language which remained for 16 centuries the language of the civilized world, and used that language to create a style which 19 centuries have not replaced, and in some respects have hardly altered." Different but in no way inferior to the stately sonorous periods of Cicero was the simple

straightforward style of Caesar, whose 'Gallic Wars', recording his campaign in Gaul, will ever remain a model of prose narration (see Caesar).

The other chief writers of the Ciceronian period are Sallust, Lucretius, and Catullus. Sallust (86-34 B.C.) is placed in the front rank of Roman historians by the accounts he has left us of the Catilinarian conspiracy and the Jugurthine war. The philosophical epic *De rerum natura* ("Concerning the Nature of Things") of Lucretius (96?-55 B.C.) is perhaps the most original and certainly next to the 'Aeneid' the greatest poem in Latin. The love poems of Catullus (84-54 B.C.) present the joy and pain of the passing moment with the same vividness that we find in the sonnets of Shakespeare.

With these names we pass from the literature of the Roman Republic to that of the Empire. As the giants of the Ciceronian period had perfected Latin prose, so their later contemporaries of the Augustan age perfected Latin verse. First of these both in time and genius was Vergil (70-19 B.C.), "the Homer of Rome." His great national epic, the 'Aeneid', is one of the supreme masterpieces of the world, yielding place only to the matchless 'Iliad' and 'Odyssey'. In his hands the Latin hexameter became "the stateliest measure ever molded by the lips of man," and the unforgettable pictures he wrought—of the last agony of Troy, of the wanderings of the "pious Aeneas," of the tragic passion of the ill-starred Dido—have moved to tears generation after generation as nothing else in all literature has done (see Vergil).

In the field of lyric and satiric verse, the genial and accomplished Horace (Quintus Horatius Flaccus, 65-8 B.C.) triumphed as surpassingly as did Vergil with the epic. He embodied his philosophy of "idealized common sense" in phrases of such unforgettable charm that many of them have become as familiar as proverbs. "The schoolbook of the European world, the 'Odes', have been no less for 19 centuries the companions of mature years and the delight of youth." In his mildly ironical 'Satires' and 'Epistles' he left the most complete and vivid picture we have of life in the Augustan age.

The Elegiac Poets

There was nothing of Horatian self-restraint and even-souled calm in the brief erratic life of Sextus Propertius (50?-15 B.C.) who flashed on the Roman world as a boy of 20 with a volume of passionate colorful poems celebrating his love for the capricious "Cynthia." A gentler and more refined young poet of the same time was Tibullus (54?-19 B.C.) in whom grace and melodiousness took the place of Propertius' fire. These two poets both used the metrical form called the "elegiac," which their brilliant contemporary Ovid (43 B.C.-A.D. 17?) polished to the same perfection to which Vergil had brought the hexameter and Horace various lyrical forms. A facile and copious writer, Ovid became the uncrowned laureate of the later Augustan age, whose glittering coldness and cynical worldliness he so perfectly embodied in

his licentious 'Art of Love'. The most attractive of his productions is his romantic 'Metamorphoses'—a fascinating narrative poem in which he has interwoven a vast number of stories from ancient mythology.

The Augustan age was the Golden Age of Latin poetry, but to this time belongs also the most famous Roman historian. Livy (59 B.C.-17 A.D.) is noted for his splendid rhetoric. He preferred literary effectiveness to historical accuracy, so that his narrative of Rome from its founding is more like a prose epic, a series of splendid pictures, than history.

The Silver Age

After Ovid and Livy the decline of Roman literature set in rapidly. The Silver Age after the reign of Augustus was so literary that it scarcely interests the general reader. All writing suffered from the custom of public readings. The author was tempted to write brilliant passages to win the praise of his listeners even though he injured his work as a whole.

The satirist Juvenal (60?-140 A.D.) and the epigrammatist Martial (40?-104 A.D.) belong to this period. Juvenal's savage castigations of Roman life have been translated and imitated by many English poets. These men are chiefly interesting now for the picture they give of life in the days of the empire. The tragedies of Seneca, with their ghosts and their lack of acting qualities, were models for tragedy, as Plautus and Terence were for comedy, among early writers of English drama. Today we read them as curiosities, though we can still enjoy Seneca's philosophical studies written in letter form.

Tacitus (55?-120?) in his perverse and vivid style gives us a number of valuable historical pictures. The 'Germania' is our only view of central Europe under the early Roman Empire. His 'Agricola' is a fine biography, and what remains of his 'Annals' and 'Histories' is our chief source for the events of the first century of the Roman Empire. Suetonius (75?-160), a writer of much less distinction than Tacitus, was one of Hadrian's private secretaries, and could therefore write his very gossipy 'Lives of the Twelve Caesars' from documentary sources.

Perhaps the most interesting writings in Silver Latin are the letters of Pliny the Younger (61?-113). The most famous one tells of the death of his uncle Pliny the Elder in the eruption of Vesuvius that buried Pompeii. As a whole these letters give a racy picture of the time that is also pictured in Juvenal and Tacitus. Pliny the Elder (23-79) was the author of a 'Natural History', which is a priceless storehouse of information about the science of ancient times. Two other works of the Silver Age strike a more modern note, the literary criticism of Quintilian and the 'Satyricon', the prose novel of Petronius Arbiter.

With the gradual breakdown of the Roman Empire after the death of Marcus Aurelius (180 A.D.), Latin literature almost disappeared. There were occasional flickers of activity, but the genuine Roman spirit was dead. Latin survived as a learned language—and still survives, for every year sees a volume of schol-

arly research written in Latin—but Latin literature may be said to have ended in the 2d century.

The various European languages have corrupted Latin pronunciation. The name *Cicero* is commonly pronounced in

France and England *Sisero*, and in Italy *Chichero*. Most American schools use the so-called Roman pronunciation, which approximates that of Cicero's time. The vowels have the same sound as in French and Italian, and *c* and *g* are given a hard sound. Thus *Cicero* is pronounced *Kikero*.

FINDING Your Way by LATITUDE and LONGITUDE

LATITUDE AND LONGITUDE. Suppose that you are a pilot, flying high above the clouds toward a distant airport. Or suppose that you are the captain of a Coast Guard cutter steaming far out to sea to aid a ship in distress. How do you find your way?

On the ground you can always see landmarks like hills or trees to guide you. In the city you can find your way by streets. But in the air above the clouds or at sea there are no landmarks or streets. You see only sky and ocean in every direction you look, except in one place. Overhead, you have guide posts. You have the sun in the day and the stars at night. The sun provides something like a landmark to tell direction. It is in the east at dawn, in the south at midday, and in the west at sunset. One of the stars is an even better landmark. The Pole Star stands almost directly north throughout the night (see Astronomy).

The early Greek and Phoenician navigators and the American Indians could tell directions by these guide posts. But if you are a modern airplane pilot or a sea captain, just knowing directions is not enough. You want to know how far you are from your starting place, and how far it is to your destination. Moreover you want some way to state locations exactly so you can figure how to steer from place to place.

To fix locations and to measure distances between them, you may use a system of imaginary lines called lines of *latitude* and *longitude*. These lines work just like city streets. The ones run-

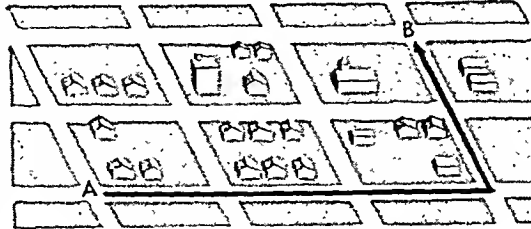
ning east and west are the latitude lines. By counting from one to the other, you can measure distances north and south. The longitude lines run north and south. You can count from one to another to determine distances east and west. How distances are determined in miles will be explained in detail later in this article.

Of course there are no real lines on the earth. We only imagine them to be there. But we can draw them on the globes that we use to represent the earth. We can also draw them on the maps we use to show the earth or any part of it, such as a continent or an ocean. From the globe or the map, we can find the latitude and longitude of any place we like. We can also find the lines for our own location by observing the sun and stars, as explained in the article on Navigation. But to do any of these, we must first understand how the lines are numbered.

Numbering the Lines

Geographers use the natural divisions of the earth to help number latitude lines. These natural divisions are the North and South Poles. The geographers use them as boundary points for the system of latitude lines around the earth. Midway between the poles, one latitude line divides the earth into two halves called hemispheres. Geographers call this line the *equator* because it divides the earth equally. They consider the equator to be at zero degrees (0°) latitude. The North Pole is then at 90° N., and the South Pole is at 90° S. Then the geographers number the lines between

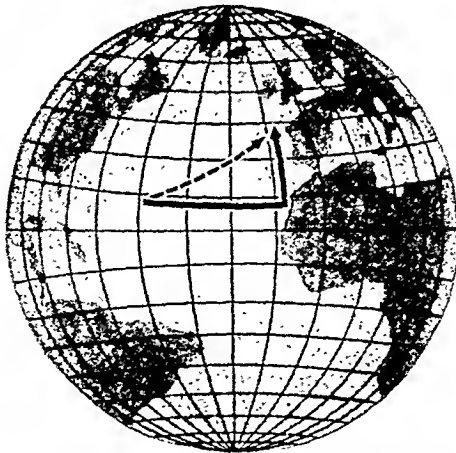
LATITUDE AND LONGITUDE WORK LIKE STREETS IN A TOWN



Streets and blocks in a town



Streets and blocks on a map



"Streets" and "blocks" on the earth

Suppose you are at a corner marked A (top picture) and you want to get to the corner at B. You must walk three blocks east and two blocks north (heavy line). The second picture shows how your walk looks on a map. The bottom picture shows how men use this "block" system for the entire earth. The only difference is that the "streets" must fit on a round earth, and that the north-south ones must come together at each pole. The east-west "streets" are latitude lines and the north-south "streets" are longitude lines. The arrows on the face of the globe show how ships and airplanes use these lines. Ships and planes could go "around the corner" as shown by the heavy arrow. Actually they "cut across" and go directly to their destination (broken arrow). But they still need the lines to tell where they start, where they are going, and how to get there.

the equator and the pole on each hemisphere from 0° to 90° N. Each numbered line goes completely around the earth. You can travel to the opposite side of the earth and stay on the same latitude line if you like.

Longitude lines are not so easy to number, because the earth does not have any natural dividing point like the equator and the poles where the numbers can start and stop. (Some special difficulties men encountered through the ages are told in the article on Longitude.) Further, the longitude circles are divided in half as they run through the poles. So the geographers must choose some one of these half-circles, and call it 0° longitude. They call this line the *prime* (meaning "first") *meridian*. The opposite of the prime meridian is halfway around the world, or 180° away from 0° longitude. So they call it the 180th meridian. Then they number the longitude lines east of the prime meridian from 0° to 180° E, and the lines west from 0° to 180° W. The pictures on the next page show why we cannot number either latitude or longitude lines like a compass, from 0° to 360° .

In the past, map makers often numbered longitudes from the meridian that passed through their national observatory—the Naval Observatory at Washington, D. C., for Americans; the Paris Observatory for the French; the Royal Observatory at Greenwich for the British. Because Britain led the world in mapping distant coasts and waters, other nations began to use British maps, and, in 1884, adopted the Greenwich meridian as the prime meridian. (Because of smog, Britain in 1948 began to move the Royal Observatory from Greenwich to Herstmonceux castle, some 60 miles southeast in Sussex. Greenwich, however, remained the prime meridian because astronomers subtract about a minute and a half for the longitudinal difference in distance—one-third degree.)

Another reason all nations use the Greenwich meridian for 0° longitude is *time*. Travelers must change time by an entire day when they cross the 180th meridian. Timekeeping and calendars would be confused if this meridian ran through a large country. The line around the world from Greenwich runs near the middle of the Pacific Ocean. The only land area it crosses are the northeast tip of Asia and some islands in the central and south Pacific. To avoid different dates in those land areas, the nations

set a special line for changing dates. It swerves from the 180th meridian wherever the meridian crosses land. This special line is the *international date line* (see International Date Line).

Other Facts about Latitude and Longitude

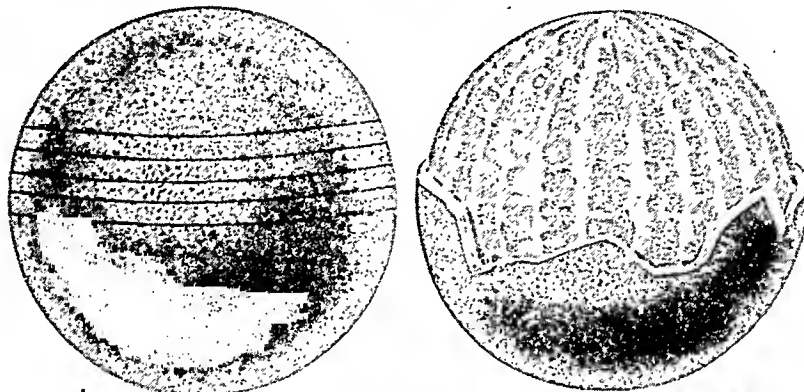
Latitude and longitude help us in the study of our world. For example, latitude holds the key to climate. It is hottest near the equator and coldest near the poles. So heat changes to cold with increase in degrees of latitude (see Climate; Earth).

Longitude lines have no such connection with climate, but they are important in our study of geography and geology. For one example, some scientists have thought that the continents might be slowly drifting on the face of the earth. This question is being continuously tested by radio time signals between various stations. If the time interval should show any

change, this would mean that the stations are moving away from their mapped longitude positions.

The word "longitude" comes from the Latin word *longus*, meaning "length." "Latitude" comes from *latus*, meaning "side." A study of the Ptolemy map in the article on Maps will show you why the ancients applied these names to the lines. The old

HOW THE LINES RUN AROUND THE EARTH



To see how latitude and longitude lines run around the earth, put an orange on the table stem end down. Slice it sidewise exactly through the middle. This cut divides the orange in two, just as the equator divides the earth into a north half (above) and a south half (below). Now make more slices above and below the first one. The edge of each cut is a line of latitude. To show longitude lines, simply place another orange like the first one and peel it. The divisions between the sections run north and south, just like lines of longitude. They meet at the ends of the orange, just as longitude lines meet at the poles.

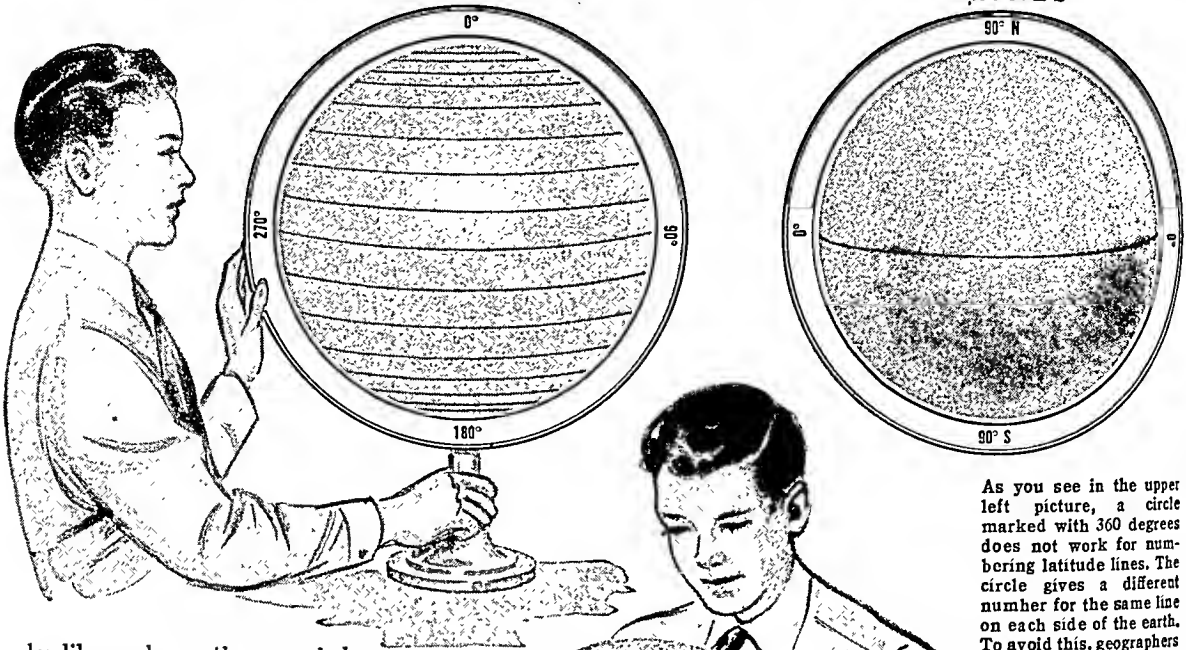
maps showed twice as much land from east to west as they did from north to south. East-west distances could be measured from a scale along the *long* edge of the map. North-south distances could be measured from a scale along the *side*.

Different Ways of Showing Degrees

So far we have said that the lines of latitude and longitude are drawn on globes and maps to show degrees. But geographers do not have to show each consecutive degree. On a small globe, or a small map that shows a large part of the earth, such as North America or the Atlantic Ocean, they may only draw every fourth, fifth, or tenth degree.

On the other hand they may want to show a small part of the earth, such as a state or country, on a large map. Then they may have to show not only each degree, but show also lines between the degrees. Each degree can be divided into 60 parts called *minutes*. Usually maps show only three or four lines within each degree for each 20th or 15th minute. On very large maps of very small areas, the minutes may be further divided into seconds. As in a minute of time, there are 60 seconds in each minute of this type. A

GETTING NUMBERS FOR THE TWO KINDS OF LINES



ruler-like scale on the map helps you measure distances in miles.

Changing Degrees into Miles

Latitude and longitude lines tell us distances in degrees, or parts of the entire distance around the earth. But usually we like to know distances in miles. Therefore we must know how to change measurement in degrees to measurement in miles.

As soon as we start to do this, we find a great difference between degrees of latitude and degrees of longitude. The picture of the oranges on the previous page shows us that the distance between any two latitude lines is the same anywhere around the earth. That is why latitude lines are often called "parallels." A degree of latitude should equal the same distance in miles wherever we measure, whether near the equator or one of the poles.

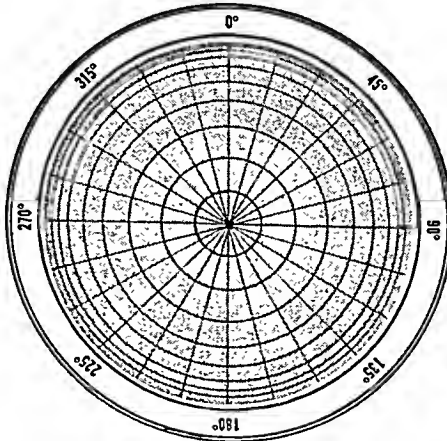
This is not true of longitude lines. As the picture of the oranges shows, the lines are spaced well apart along the equator. Here a degree of longitude has the same value as a degree of latitude. But as the lines run toward each pole, they come closer together. At the poles they all run together to form a point. Hence a degree of longitude measures less and less in miles as it is measured farther from the equator and nearer to the poles. (Geographers often say that the mileage becomes less when longitudes are measured in "higher" latitudes. They use "higher" because the numbers of the latitude lines

As you see in the upper left picture, a circle marked with 360 degrees does not work for numbering latitude lines. The circle gives a different number for the same line on each side of the earth. To avoid this, geographers call the equator 0° latitude and number the lines to 90° at each pole (upper right). A circle placed horizontally (center) would give a separate number for each longitude line. But geographers count from 0° longitude each way around to 180°, and label the numbers E. or W. (bottom). This system shows the distance of a longitude line from the prime meridian.

get bigger from the equator to the pole.)

For ordinary purposes, we figure the circumference of the earth as 25,000 miles. We use this rough figure for the circumference around the equator or north and south through the poles. But the earth also measures 360°. On this basis, each degree of latitude would be 1/360th of 25,000 miles, or about 69 miles. Each degree of longitude, as measured along the equator, would also equal about 69 miles. But this rough calculation is not exactly correct. The 69-mile

value for one degree is not quite true, for two reasons. For one, the circumference of the earth is not exactly 25,000 miles. For another, the earth is not quite a perfect sphere (see Earth). It bulges out a little around the equator, and it levels off a little at each pole. Therefore degrees of latitude vary slightly in value from



the equator to the poles. A table of values for latitude and longitude in statute (ordinary) miles is given below.

Lat.	Length of 1° of Lat.	Length of 1° of Long.	Lat.	Length of 1° of Lat.	Length of 1° of Long.
0	68.70 mi.	69.17 mi.	50	69.12 mi.	44.55 mi.
5	68.71	68.91	55	69.18	39.77
10	68.73	68.13	60	69.23	34.67
15	68.75	66.83	65	69.28	29.32
20	68.79	65.03	70	69.32	23.73
25	68.83	62.73	75	69.36	17.96
30	68.88	59.96	80	69.39	12.05
35	68.94	56.73	85	69.40	6.05
40	68.99	53.06	90	69.41	0.00
45	69.05	49.00			

LATVIA. Latvia or Letvia—the “land of the Letts”—is one of the three Baltic States that enjoyed brief freedom after the Russian Revolution of 1917. It comprises most of the former czarist provinces of Courland and Livonia and lies between Esthonia and Lithuania. The Gulf of Riga makes a deep indentation on the northwest coast. Latvia has 307 miles of seacoast, and good harbors at Riga, the capital, Libau (Liepaja), and Windau (Ventspils). Its area is 24,840 square miles; population (1947 est.), 1,800,000.

Much of Latvia is low and marshy, though Livonia has wooded hills and pretty lakes. One man, Baron Osten Sacken, once owned a large part of Courland; but after 1917 many of the big estates were divided. The Letts form 76 per cent of the population. With the Lithuanians they form a branch of the Indo-European family akin to the Slavs. More than half of the people are Lutherans.

Latvia is chiefly an agricultural country, but industries are claiming more workers. Rye, barley, oats, potatoes, and flax are the main crops; timber, flax, and butter are the chief exports. It has about 2,000 miles of railroads, the same mileage of inland waterways, and some 600 miles of paved roads.

In the 13th century what is now Latvia was part of the territory conquered and Christianized by crusading Teutonic knights. In the 16th century the region came under Poland's rule. In 1629 Sweden annexed Livonia, but a century later it fell to Russia. Courland was annexed by Russia in the third partition of Poland (1795), and the two provinces formed part of the czar's realm until the Russian revolution of 1917. Then Latvian nationalists rose up, and in November 1918 proclaimed a new republic.

Latvia existed as an independent nation little more than 20 years. In 1939, while most of Europe was engaged in the second World War, Russia exacted military concessions from Latvia. In July 1940 a newly

elected Latvian parliament voted, as did those of Lithuania and Esthonia, to incorporate the nation into Russia as the fifteenth Soviet Republic. After the country was overrun by the Germans in 1941, it was made a province of the Reich. But in 1944 the Red army drove the Germans back toward the west, and Russia once more claimed Latvia as a part of the Soviet Union. (See also Russia.)

LAUNDRY AND DRY CLEANING. Washing clothes is still a sudsy Monday morning job in more than three-fourths of American homes. But the task is far easier than it once was. Modern home-laundry equipment has eliminated the back-breaking strain of scrubbing and wringing. Even ironing has been relieved with rotary ironers and light-weight hand irons.

Many homes send part of their washing, such as shirts or diapers, to one of the thousands of professional, hand, or Chinese laundries. Other homes send out their whole washing bundle for “wet wash,” “rough-dry,” or “finished” service. Still others bring their laundry to a convenient neighborhood “laundrette” or “laundromat,” where they can use automatic equipment for a small fee. In large cities some apartment houses provide rental equipment in the building basement. Fabrics that cannot be safely

TWO METHODS FOR CLEANING CLOTHES



Top, the dry cleaner uses special chemicals for removing stains. To eradicate the remaining ring, she uses a compressed air jet. Bottom, at a “laundrette” the only task is to load the machine, which washes, rinses, and spin dries automatically.

washed with soap and water are dry-cleaned, either at home or in a professional establishment.

Chemical and Mechanical Aids to Washing

These familiar steps are common in all laundering: soaking the clothes in sudsy water; agitating the clothes in the water; rinsing out soap and dirt; extracting most of the rinse water; drying and ironing. Improved chemical aids help make the clothes cleaner. "Hard" water, containing minerals that prevent soap from lathering, is treated with water softeners. The soap may be in easily dissolved flake or granule form or it may be a synthetic detergent (*see Soap*). Often added are bleaches to remove discoloration from white fabrics and bluing to prevent the fabric from turning yellow. Starch gives stiffness and gloss.

The chief job of the washing machine is to supply action. One type uses an agitator on a central post that swishes clothes through the water. Another holds the clothes in a perforated basket or cylinder and tumbles them back and forth. Many home washers still have a wringer for squeezing out excess water between resilient rollers. Others use the basket as an extractor, spinning it to throw excess water out by centrifugal action. The completely automatic machine, aided by timers and controls, performs all steps from soaking to extracting.

After drying, the clothes are ironed. The rotary ironer, made up of two electrically heated padded rollers, will press most of the family's laundry. An expert can use the rotary ironer to finish such delicate work as ruffled curtains and shirt collars. The light-weight electric hand iron depends on heat and moisture rather than on the weight of the iron or pressure.

Swift, Sanitary Treatment at the Laundry

At the laundry, each piece is identified by an indelible mark, then sorted according to fabric, color,

and degree of dirt. Each group is tagged and put into a net bag. The washer is a huge cylinder, made of stainless steel or Monel metal. The cylinder, holding as much as 800 pounds of laundry, revolves in a water-filled shell. It tumbles the bag through one or more suds baths and four to six rinses. After washing, an extractor whirls the water out.

"Wet wash" is ready when it leaves the extractor. "Roughdry" is dried by fan-driven heated air. "Finished work" is starched, dried, and ironed on giant rotary ironers or special molding forms, such as those used for shirts, each shaped for a special part of the shirt. Many laundries are named "Troy," after

HANDLING "ROUGHDRY" AT THE LAUNDRY



The dry tumblers at the right raise the nap of such pieces as turkish towels and cotton rugs. Hot air blows through the pieces as they turn over. Women in the background are sorting and folding roughdry pieces.

Troy, N.Y., where the steam laundry and manufacture of laundry machinery chiefly originated.

The Delicate Work of Dry Cleaning

Many fabrics cannot be washed in water because it would change their size, shape, and color. For centuries the only method of cleaning silks, velvets, and woolens was to rub the spots and stains with a damp cloth. Today all these go to the dry cleaner.

The first grease solvents were derived from petroleum, such as those loosely called benzine, naphtha, or gasoline. These are highly inflammable and leave a strong odor. The noninflammable carbon tetrachloride was used for a time, but its fumes are extremely poisonous and had to be drawn off from the cleaning vats. Then a wide variety of chlorinated hydrocarbons (such as trichloroethylene) came into use. These have little odor and are noninflammable.

Garments are agitated in a clear solvent, then in a soapy solvent. Next they are rinsed in a clean solvent and whirled dry. Expert spotters remove stains with special fluids, but certain stains may defy all treatment. Finally the garment is pressed, inspected, and mended.

WASHING AND EXTRACTING BY MACHINERY



Sorted laundry passes directly from the chutes to the large horizontal washers at the right. The row of low round extractors whirl water from the rinsed laundry by centrifugal action.

LAUREL. The best known species of these hardy shrubs is the American or mountain laurel, which is found from Pennsylvania southward, and is especially abundant in the mountains of the Carolinas and Tennessee. It is a shrub varying from 2 to 20 feet in height. During June and July it bears beautiful white or rose-colored flowers, some of which exhale a pungent perfume. The leaves are rather large and lance-shaped and are shining and leathery.

The bay or sweet laurel (*Laurus nobilis*), having yellowish green flowers, is found in the Mediterranean districts of Europe and in Great Britain. It belongs to the family which includes the sassafras and camphor, trees remarkable for their aromatic

qualities. From the berries and other parts of the sweet laurel is distilled an aromatic oil used in the manufacture of toilet waters. The dried leaves also are used for flavoring in cookery and pickling. The ancient Greeks used the entwined twigs of this tree to crown victors of the Pythian games. The tree was sacred to Apollo, and the nymph Daphne when pursued by Apollo was, in answer to her prayers, changed into a laurel. The custom of placing a laurel crown on the brow of poets dates from the Middle Ages.

The mountain laurel belongs, not to the classic old-world laurel family (*Lauraceae*), but to the heath family (*Ericaceae*). The name of laurel is given also to shrubs of the rose and other families. Old-world laurels are found in southern Asia as well as in Mediterranean Europe. Cases of poisoning have been traced to wild honey gathered from the pretty flowers of some species of laurel, while the leaves of other species are deadly to live stock. The beauty of the shrubs makes them popular among gardeners and they are extensively cultivated.

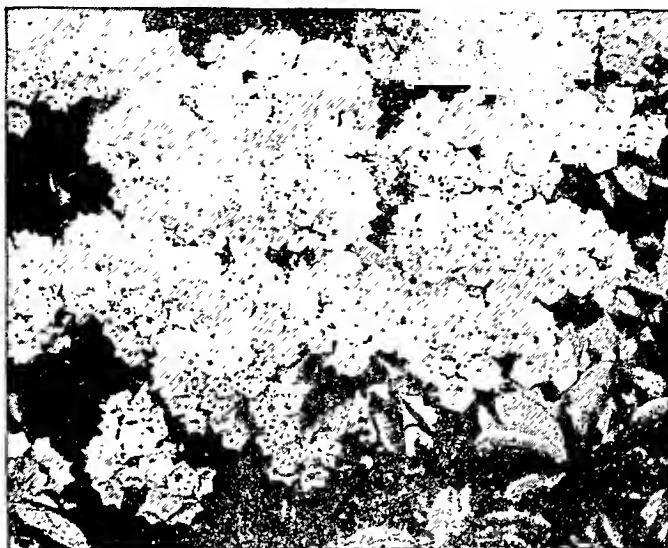
Scientific name of the mountain laurel, *Kalmia latifolia*. Evergreen shrub or treelike plant; leaves bright green, pointed at both ends; flowers numerous, in terminal clusters, varying from white to pink, with one pistil and 10 stamens; round seed capsule; stem hard, smooth, and brownish.

LAURENTIAN PLATEAU. Eastern Canada rests upon some of the oldest rock in the world. This rock, which exists in a vast mass called the Laurentian Plateau, or Canadian Shield, was dry land ages ago when the oceans still rolled over the sites of the Appalachians and the Rockies; and throughout geologic time it has been a firm anchor for the continent. Later it was

uplifted to form a plateau, and then was carved by stream erosion; finally it was planed almost level by mighty glaciers. This combination of uplift and ero-

sion gave eastern Canada its present-day appearance as a rocky tableland, deeply carved by rivers. The Saguenay, a tributary of the St. Lawrence, with great fiordlike cliffs rising in some places to 1,500 and 1,700 feet, has some of the most sublime river scenery in the world, and is yearly visited by thousands of tourists. The Muskoka lake region in Ontario, with almost 1,000 island-dotted lakes and ponds, surrounded by beautiful forest scenery, is another favorite summer resort. The whole plateau is so covered with winding waterways and lakes

THE MOUNTAIN LAUREL IN FULL BLOOM



The small blossoms that make up the showy flower clusters of the Mountain Laurel are from three-fourths of an inch to a full inch across. Many tons of the shiny evergreen foliage of this plant are used each year for Christmas wreaths and other decorations.

that, by making occasional portages, one can travel in almost any direction by canoe.

Shaped like a great "V," with the Hudson Bay in the center, the Laurentian Plateau in the widest use of the term underlies 2 million square miles—more than half of Canada. On the east, it underlies most of Quebec and Labrador; on the south it extends through Ontario as far as Lake Superior and the Adirondack Mountains. Portions of its southern edge are exposed in northern Michigan and Wisconsin. Its western edge borders the Great Plains and may be traced by the line of lakes running northwest from Lake Winnipeg to Great Slave and Great Bear lakes. The plateau is tilted from a clifflike edge in Quebec and Labrador to sea level around Hudson Bay. A slight dome, called the Height of Land, divides the St. Lawrence drainage to the Atlantic and the drainage to the north. Scattered beds of glacial drift, which block old stream beds, have produced a great number of lakes. The average elevation is 1,500 feet, but some parts are 6,000 feet high.

Minerals are of the sort usually found in the granite and other igneous rocks which make up the plateau. No wealth of coal or petroleum exists, but metals are abundant, particularly gold, nickel, copper, platinum, silver, cobalt, and rare metals, including radium. The nickel deposits near Sudbury, Ont., are among the richest in the world.

Thick evergreen forests cover the region as far north as the timber line; the "barren lands" beyond are rarely visited by whites. Great herds of caribou and musk oxen roam this region, and are hunted occasionally by Indians and Eskimos.

LAURIER (*lō-rē-yā'*), SIR WILFRID (1841-1919). The first French-Canadian to become prime minister of Canada was Wilfrid Laurier. Though French was his native tongue, he became a master of English oratory. His eloquence and picturesque personality made him popular throughout Canada, and he led the young Dominion in a 15-year period of great development.

Laurier was born at St. Lin, Quebec, and studied law at McGill University. After three years in the Quebec legislature, he was elected to the Canadian House of Commons in 1874. There he rose rapidly to leadership. Although he was a French Canadian and a Roman Catholic, he was chosen leader of the Liberal party in 1887. Nine years later he became prime minister. He was knighted in 1897.

"Build up Canada" was the watchword of Laurier's government. He was loyal to Great Britain, sent Canadian volunteers to help in the Boer War, established a tariff favorable to British goods, and worked to establish sympathetic relations between the two countries. But he saw the British Empire as a world-wide alliance of free and equal nations, and he opposed every attempt to limit Canada's freedom.

Laurier's immigration policy brought hundreds of thousands of settlers to the western provinces. He reduced postal rates, promoted the building of railroads, and appointed a railway commission to regulate rates. After 15 years in office his government was defeated on the issue of reciprocity in trade with the United States.

LAVA. The more or less completely melted rock discharged from volcanoes is called lava. Molten lava is a thick fluid permeated with gases and steam. Its fluidity depends on its temperature, the amount of vapors it contains, and its chemical composition. Newly ejected lava may flow as fast as 50 miles an hour, but it usually slows down to less than a mile an hour.

If lava contains not more than 58 per cent of silica it is called basic. It comes from deeper levels of the earth. It melts at about 2,250° F. *Acid* lava contains 66 per cent or more of silica. It comes from the upper shell of the earth and remains pasty even at 3,000° F. Lavas of Stromboli in the Lipari Islands, the Hawaiian Islands, and Skaptar Jokul in Iceland are basic. *Basic* lava flows faster than acid lava and goes farther before it cools, making a low cone with gentle slopes. Mount Shasta, Mount Hood, and Mount Rainier on the Pacific coast and Vulcano of

the Lipari Islands were formed by the accumulation of acid lava and have high steep cones.

If acid lava cools too quickly for its minerals to crystallize, it forms glasslike *obsidian*. A partial crystallization results in *rhyolite*. Acid lava having large crystals embedded in a matrix of small crystals is called *porphyry*. Basic lava cooled to a prismatic structure that forms columns and stairs is called *basalt*. The top of lava is often frothy from bubbles of gas. *Pumice* is rock froth light enough to float on water. Powdered pumice is used in grinding glassware, in making soaps for mechanics, and for polishing various materials. Great quantities are exported from the Lipari Islands. (See also Volcanoes.)

LAVOISIER (*lāv-wāz-yā'*), ANTOINE LAURENT (1743-1794). One of the most honored men in the history of science is the Frenchman Lavoisier. For more than a century before his day, chemists had been hampered by a false theory about fire and the burning of matter. By revealing the truth Lavoisier helped chemistry make its remarkable advance from that time on.

Lavoisier was born in Paris, the son of a rich lawyer and landowner. His father bought a title of nobility and wanted an aristocratic career for the boy. But young Antoine preferred science, so his father sent him to many famous scholars. Antoine studied mathematics at Mazarin College under the Abbé Lecaille. At the Jardin du Roi he studied botany and lectured. At the same time he studied chemistry under Bernard de Jussieu.

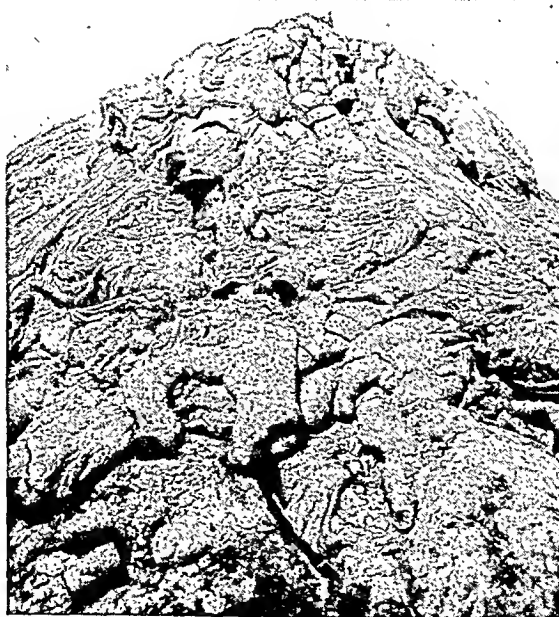
When only 23 years old he won a prize from the Academy of Science for an essay on the lighting of cities. Then he toured France, preparing the first geological survey of the country. Two years later he was elected to the Academy of Science, an unusual honor for so young a man. The same year he was appointed to the *ferme générale*—a body of men who held

the right to collect ("farm") taxes. In 1776 he began his life career as director of the government arsenal.

He started work in the arsenal in the same year the American Colonies issued their Declaration of Independence; and the colonial troops soon profited by using his improved French gunpowder. By 1783 Lavoisier had solved the chemical puzzle of the day, by proving the connection between oxygen and fire.

At the time, Joseph Priestley, Henry Cavendish, and Joseph Black had identified the gases oxygen, hydrogen, and carbon dioxide in air. But they misin-

OUT OF THE FIERY FURNACE



When lava flows down a slope, the sticky mass often cools in fantastic shapes. This mass was ejected from the crater of Kilauea on the island of Hawaii.

terpreted their discoveries in terms of a false theory that burning involved an invisible "essence" called *phlogiston*. Black, for example, thought that carbon dioxide was air combined with *phlogiston*. Cavendish explained oxygen as "dephlogisticated air." By brilliant experiments and delicate measurements Lavoisier proved that burning, the rusting of metals, and the breathing of animals all consisted of the union of oxygen with other chemicals. Since this union (oxidation) is one of the most important chemical processes, his discovery started the development of modern chemistry.

In 1789 the French Revolution began and put a tragic end to Lavoisier's

career. He had become commissioner of weights and measures, and in 1791 he was appointed a commissary of the treasury. But in 1794 he was accused, with other members of the *ferme générale*, of plotting to cheat the government. For this he was executed by the Revolutionary tribunal.

LAW. We use the word law with at least three fundamentally different meanings. In its widest sense, law expresses the relation between cause and effect. Students of the sciences found, after long observation, that natural objects and forces can be depended upon to act in certain ways; these ways are natural laws. Thus the chemist speaks of the law of the conservation of matter; the physicist, of the laws of motion; the biologist, of laws of heredity.

In a narrower sense the word law refers to the social life of man. Thus we speak of laws of etiquette, laws of honor, and the moral law. When people first began to live in groups they had no rules or laws, but they soon realized that each man had to pay attention to the needs and welfare of his neighbors in order to make life not only pleasant but possible for the greatest number. These rules or customs were at first unwritten and were not always observed. When law in this second sense failed, the state made laws in a third sense. It set up a strict and positive set of rules or codes and enforced them.

Development of Positive Law

The best known of the earliest codes to come down to us is that of Hammurabi, king of Babylonia, who lived about 2100 B.C. (see Babylonia and Assyria). Another Babylonian king, Lipit-Ishtar, had set up a similar code of laws perhaps 150 years earlier. (Parts of these laws were discovered on four pieces of clay tablet in the University of Pennsylvania Museum. The tablets had been unearthed before 1900 but were

GENIUS FACING A MOB—A TRAGEDY OF SCIENCE



Because Antoine Lavoisier had been a tax collector, he was dragged to prison by the Paris revolutionists in 1794. Someone protested that he was a distinguished chemist. "The Republic," replied the mob leaders, "has no need of scientists!" Lavoisier was condemned and executed.

overlooked until 1947.) In the 7th century B.C. Draco compiled the first Athenian code. But it proved too harsh and gave way to the laws of Solon (see Solon).

The Romans built up a remarkable body of laws based on custom. But they let their judges and law-makers modify laws or add to them as need arose. Finally the Emperor Justinian codified them as the Roman Civil Law. Roman law has determined the general character of the laws of every nation in western Europe but England. (See Justinian I.)

Before the Normans invaded England, each manor, borough, or shire had its rules based on established custom—laws of tradition. After the Norman conquest, judges appointed by the king moved from place to place to administer these local laws, and gradually popular custom gave way to judicial custom. In time, the decisions of the judges, constantly modified by later decisions, were accepted as the body of English "common law." Except in Louisiana, where the Code Napoleon prevails (see Louisiana), civil law in the United States is based on English common law.

Statute law, or legislation, is another kind of law, which grew up because new conditions arose, to which judge-made or common law did not apply. This is law made by legislative bodies, such as parliaments, congresses, and legislatures. Furthermore, two chief types of law came to be recognized: civil law, which sets forth the rights of persons, with methods for maintaining or regaining them; and criminal law, which deals with actions harmful to the public and the private good, and with punishments for offenders. Constitutional law is the basic law of a state; it provides the framework of the government.

Canon and Martial Law

Canon law arose in the Middle Ages to deal with church matters. The New Code of the Canon Law is a

collection of all the disciplinary laws of the Roman Catholic Church. Military law is used for governing a military organization. Martial law is the suspension of civil laws in time of emergency and the enforcement of military law on the civilian population. Parliamentary law is not "law." It is a body of rules to regulate the procedure of a deliberative group. Jurisprudence is the science of the nature of law and the study and classification of laws. (See Courts of Justice; International Law; Jury; Parliamentary Law.)

The law profession is crowded, but many find legal training good preparation for business. Requirements for admission to the bar differ in various states. The American Bar Association standard is two years of college followed by three years in law school. (See Vocational Guidance.)

A list of the terms most commonly used in law will be found with the entry Law in the FACT-INDEX. **LAWRENCE, JAMES (1781-1813).** "Don't give up the ship!" cried out young Captain Lawrence, commander of the U.S. frigate *Chesapeake*, as his men were carrying him below, mortally wounded. These words were used later by Captain Perry on his flag at the battle of Lake Erie.

James Lawrence, a native of Burlington, N. J., entered the navy as a midshipman at the age of 17 and rose to the rank of lieutenant in 1802. During the war with the Tripoli pirates (1804-5) he was second in command to Stephen Decatur. At different times he commanded the *Argus*, *Vixen*, *Wasp*, and *Hornet*. As commander of the *Hornet*, early in 1813, he captured the British sloop of war *Peacock* after a spirited 15-minute engagement. For this, Congress gave him a gold medal.

A few months later he commanded a poorly trained crew on the *Chesapeake*. On June 1, 1813, the *Chesapeake* sailed out of Boston Harbor to meet the British frigate *Shannon*. The two ships were about equal in size and guns, but the crew of the *Shannon* was experienced and well trained. Lawrence was courageous and skillful but overconfident. After a short fierce fight, the *Chesapeake* was disabled and Lawrence fatally wounded. He died a few days later in Halifax, where his captured vessel was taken. His body was later returned to the United States and buried in the yard of Trinity Church, New York City.

LAWRENCE, THOMAS EDWARD (1888-1935). A motorcycle accident on an English country lane closed one of the most remarkable careers of the first World War. "Lawrence of Arabia" became famous

for his amazing exploits as leader of the Arab revolt against the Turks (1916-18); and his dislike of publicity made him an almost legendary figure.

Lawrence was born in North Wales. After secondary school he enrolled in Oxford, where his unusual personality began to show. He rarely attended classes but read continuously. After college, his interest in the Middle Ages took him to the Near East to study the castles of the Crusaders. He tramped all over Palestine, Syria, and Mesopotamia.

When war began in 1914, Lawrence was eager to take part, but he was rejected for active service because of his short stature. He found a place in the War Office, however, and was transferred to the intelligence service in Egypt. Soon he was sent to Arabia with the rank of colonel.

To weld the scattered Arab forces into a fighting unit, Lawrence became almost literally an Arab himself. He adopted Arab dress—flowing robes and a chieftain's headdress—and rode on swift camels. Under his leadership the Arabs executed lightning maneuvers against the Turks, routing them from strong positions and blowing up supply trains. After a series of battles his forces completely destroyed the Fourth Turkish Army and captured Damascus.

The war over, Lawrence looked after Arab interests at the peace conference. He took prominent part in the Middle Eastern Settlement of 1921. Then he retired from public life to write 'Seven Pillars of Wisdom', his account of the revolt. An abridged edition, 'Revolt in the Desert', was issued later. With this done, he sought complete obscurity. He entered the army as an enlisted man and changed his name, first to Ross, then

to Shaw, to escape attention. Throughout his life he refused any reward or decorations for his war service. **LAWRENCE, MASS.** This city has long been the nation's chief center for the manufacture of worsted cloth. Three large worsted mills make this industry the most important in the city. Second is the manufacture of cotton textiles.

During the 1920's Lawrence lost some of its cotton-textile business to the South. But it then began a successful campaign to attract new industries to the city. Its most important industries today, in addition to textiles, are machine shops, and the manufacture of shoes, wood products, men's clothing, and hard-rubber goods.

Lawrence lies on the Merrimack River 30 miles from the ocean and 26 miles northwest of Boston.

T. E. LAWRENCE



This young British colonel led the Arabian revolt in the first World War.

JAMES LAWRENCE



A gallant commander, Lawrence gave the United States Navy a famous motto.

The water power of the Merrimack, derived from a great dam begun in 1845, was the reason for the development of industry at this point. The town was incorporated in 1847 and named in honor of Abbott Lawrence, a member of a famous family of Massachusetts merchants and manufacturers, and a director of the company which built the dam. A structure of heavy granite, 900 feet long and 30 feet high thrown across the rapids, this dam now furnishes about 15,000 horse-power.

Lawrence is the center of a district known as Greater Lawrence, including the towns of Andover, North Andover, and Methuen in Massachusetts, and Salem in New Hampshire. Many of those employed in the manufacturing establishments of Lawrence live in these near-by towns. The city has the commission form of government. Population of Lawrence (1950 census), 80,536.

LEAD. Among the heavy metals lead is one of the most useful. Lead has done more to civilize man than gold or silver or jewels, for type used in printing is made of lead alloyed with tin and antimony.

Lead is indispensable in industry. That important but destructive agent, sulphuric acid, is made in lead chambers, on which the acid forms a protective coat of lead sulphate, soluble only in concentrated acid. Lead blocks the passage of X-rays and of radium rays, both of which are destructive when not controlled; so shields of lead are used to protect operators working with these types of radiation.

Many and Varied Uses of Lead

Lead helps the scientists to study the structure of the blood cells and to analyze the gases of the sun, for part of the refractive glass of microscopes and telescopes is lead. We speak of "leaden skies," yet the sparkle of optical glass and the brilliancy of cut glass are both due to lead. We can take better pictures, and read by a more brilliant light because of the lead in camera lenses and electric light bulbs.

Lead has been used for water pipes since the earliest times, and is still sometimes used in plumbing, though iron is more common. The Romans, the first plumbers, called lead "plumbum," from which comes its chemical symbol Pb. A section of lead pipe dug up in Rome bore an inscription showing that it had been made about 70 A.D. It had lain in the ground for more than 1,800 years and was still in good condition.

Basic lead carbonate, white lead, helps make the best paints; red lead, or *minium* is used to prevent rusting of iron structures; litharge or lead monoxide is the compound used in making flint glass and glazed pottery. Lead helps to protect electric cables, lines chemical tanks, and makes plates for storage batteries, and is widely used in building. Mattresses of lead are used as shock absorbers in the foundations of skyscrapers. Lead, alloyed with tin, antimony, and copper, makes one kind of babbitt, an anti-friction metal used in machine bearings. The useful and ornamental pewter is usually an alloy of lead and tin, sometimes combined with other metals (*see Alloys; Battery*). Lead compounds are used to hasten the

vulcanization of rubber. With a little arsenic, tin, or antimony, lead makes shot and shrapnel bullets. Shot is made by dropping molten lead from a height into cold water, or by running the metal through small holes into molds. Solder, so necessary in modern industry, is an alloy of lead and tin in varying amounts. An anti-knock motor fuel contains tetraethyl lead. By raising the temperature and pressure at which gasoline explodes, it keeps hot carbon from firing the more volatile portions prematurely.

The United States produces about one-third of the world output. Every year it consumes from its mines, stockpiles, scrap recovery, and imports an amount equal to about four fifths of the world production. The leading lead-producing states are Missouri, Idaho, Utah, Arizona, Colorado, Montana, and Oklahoma. Other producing countries are Mexico, Australia, Canada, Russia, Belgium, Germany, France, Peru, and Spain. In many places deposits of ore contain silver.

How Lead is Mined and Purified

Lead is mined chiefly in the form of galena, lead sulphide, and is obtained mainly from mines worked through shafts and tunnels. The ore is loosened by drilling holes in it, and exploding dynamite in the holes. Small cars haul the broken rock to the surface, where it is put through crushers which separate the lead from a large part of the waste rock. It is mixed in a blast furnace with iron ore, limestone, and coke, and brought to a heat sufficient to melt the mass to liquid form. The sulphur is driven from the lead sulphide by the heat and the action of the iron oxide; and the heavy molten lead settles to the bottom and is drawn off. The slag, which floats on the molten metal, is removed through another opening. The metal is run into molds to form "pig" lead. Galena, Ill., and Galena, Kan., were named from the large deposits of galena ore in the vicinity.

All lead compounds are poisonous, and the poisons are "cumulative"; that is, they accumulate in the body, gradually producing more serious conditions, from colic to nerve paralysis, blindness, convulsions, insanity, or even death. There is little danger from lead plumbing if the water is "hard"; such water forms a closely adhering coat of salts on the pipe which prevents further action. "Soft" water may dissolve some lead and should not be piped in lead.

Lead was used in very ancient times. It is mentioned frequently in the Old Testament. As far back as 2000 B.C. it was used to purify gold and silver, and was mined in Greece. For centuries Spain was the greatest producer, until the United States jumped to the front late in the 19th century. More recently other nations have also passed Spain in amount of production.

It is believed that certain forms of lead are the end products in the breaking down of uranium through the radium or other series. Lead found in uranium ores has an atomic weight of 206, while ordinary lead has an atomic weight of 207.2, and is believed to be a mixture of three isotopes, with weights of 206, 207, and 208 (*see Chemistry*). All forms are chemically identical.

LEAGUE OF NATIONS. The League of Nations was created in 1920. Its covenant was written into the peace treaties that closed World War I. Twenty-six years later, at the end of World War II, it passed quietly out of existence. At its last meeting, April 18, 1946, it gave the United Nations its technical services and buildings, including its huge empty palace in Geneva, Switzerland.

The League of Nations was the first real attempt to set up an organization to maintain peace. It was to be a world-wide institution, with all the great powers participating. However, the United States, which had fathered the covenant, refused to join. Other nations withdrew when League decisions went against them. Japan left in 1933, Germany in 1935, Italy in 1937, and Russia in 1939. When a second world war threatened, the League was powerless.

The League of Nations was first suggested in the Fourteen Points presented Jan. 8, 1918, by Woodrow Wilson, president of the United States, as a basis for armistice negotiations. After the peace negotiations opened, the work was continued by a commission headed by Wilson. A working plan, called The Covenant of the League of Nations, became Section I of the Treaty of Versailles. The League came officially into existence with the ratification of this treaty on Jan. 10, 1920. The first Assembly met in Geneva, Nov. 15, 1920, with 41 nations represented. More than 20 nations joined later but there were numerous withdrawals. In 1946 the League had a membership of 44 nations.

The organization, powers, and purposes of the League were stated in 26 articles of the Covenant. Its specific aims were to promote arbitration for settling international disputes; to bring about reduction of armaments; to study and remove the causes of war; and to promote world interests in all fields of human work. The organization consisted of the Secretariat, headed by a secretary general; the Council, normally 14 members, five permanent and nine non-permanent; and the Assembly. The Council early set up the Permanent Court of International Justice, or World Court, at The Hague, Netherlands. Although the United States was not a League member, an American judge sat on this court by invitation.

All the member nations agreed to submit to the League's procedure any international dispute that was likely to lead to armed conflict. If the Council made a unanimous report (the votes of the disputing states not counting), the League members were bound not to declare war on the disputant complying with the Council's report. The members agreed to use "sanctions" (financial or economic blockades) against any member nation that went to war instead of submitting its dispute to the League. The Council had no international army to carry out its decisions, but it could recommend the use of force against an offending nation.

After World War I, the League helped stabilize finances and bring relief to the war victims. It aided in suppressing slavery and the illicit narcotics

trade, helped improve working conditions, established institutions for the study of disease, and found havens for political and religious refugees. It set up many committees, such as the Mandates Commission, which examined the reports of the mandatory powers governing territories taken from Germany and Turkey. It successfully arbitrated a number of international disputes until its later years, when it suffered a series of defeats. In defiance of the League, Japan invaded Manchuria and China; Germany absorbed Austria and Czechoslovakia; and Italy annexed Ethiopia and Albania. (*See also* Europe; World War, First.)

LEAR, EDWARD (1812-1888).

How pleasant to know Mr. Lear!

Who has written such volumes of stuff!

Some think him ill-tempered and queer

But a few think him pleasant enough.

Edward Lear so described himself in the delightfully comic limerick form that he made famous. His "volumes of stuff" were books of limericks and other verses which he illustrated himself. He was neither ill-tempered nor eccentric; rather, he was a gentle, friendly man who made friends everywhere, especially among children.

Lear was born May 12, 1812, in London, England. He was the last of a huge family of 21 children. Their father, once a wealthy stockbroker, was imprisoned for debt; and Edward had to start earning his own living at 15. He had always enjoyed drawing pictures of birds, animals, and plants; and he soon began to specialize in natural history and medical drawings. He was hired to make drawings of the brilliantly colored parrots in the Regent's Park Zoo in London, and in a year he had produced 42 lithographic plates. Precise in line and faithful in color, these won the acclaim of many scientists.

Seeing them, the 13th Earl of Derby invited Lear to come to Knowsley Hall, his estate near Liverpool, and make drawings of his private menagerie. Lear became the favorite of the earl's nieces, nephews, and grandchildren. He entertained the children with comic drawings and with such limericks as:

There was an Old Man with a beard,

Who said, "It is just as I feared!—

Two Owls and a Hen, four Larks and a Wren,

Have all built their nests in my beard."

These verses were published in 1846 as 'A Book of Nonsense', dedicated to the Knowsley Hall children. It was followed years later by 'Nonsense Songs, Stories, Botany, and Alphabets' (1871), 'More Nonsense Pictures, Rhymes, Botany, Etc.' (1872), and 'Laughable Lyrics' (1877). For several years, Lear traveled in Europe and Asia, making sketches for landscape paintings and writing illustrated travel journals. He gave painting lessons to Queen Victoria, and she and the Prince of Wales maintained a constant interest in his work.

Lear never married. He depended upon his friends, among them Alfred Tennyson and the painter Holman Hunt, for companionship. He died in 1888, in San Remo, Italy, where he had spent his last years.

LEARNING *for* *the* ENRICHMENT *of* LIVING

LEARNING. At birth a child is the most dependent of creatures. He could not survive without help from others. As he grows older he becomes increasingly independent. Aimless kicking and crying are replaced by asking for what he wants and by getting things for himself. He buttons his clothes without help. He speaks new words every day. The tricycle that gave him so much trouble at first he can now ride with little effort. Next he is counting, repeating the alphabet, and printing his name.

Thousands upon thousands of similar skills are acquired during childhood. All these things are learned. At birth the child has only the ability to learn them. Learning is acquiring new reactions and modifying old ones. Skills and certain other acquisitions are called habits (*see* Habit). Learning itself is sometimes referred to as "habit formation." In addition to skills there are study habits, habits of thought, the smoking habit, and so on. Some habits are "bad" and others "good." But the learning process is essentially the same whether the habits are good or bad and whether they are primarily muscular (like riding a bicycle) or verbal (like counting).

Growth of Learning Ability

The brain of a newborn baby is only one fourth of its adult size. It is also immature in other ways. Millions of nerve fibers must grow and interconnect before it is fully developed. This immaturity explains in part the baby's poor learning ability. He has not yet learned that he can learn. There is no foundation on which to start.

Within a few weeks after birth, however, learning is well under way. Having learned that crying brings attention the baby soon learns to stop crying when he is picked up. Soon he becomes quiet when he just hears his mother's voice. He has learned to associate



A baby must learn to give meaning to all the new sensations around him. This baby is becoming acquainted with his mother's face and voice.

sounds and persons. Although he is not aware of it, he has begun to learn that it is possible to change his environment through his own actions. He is learning how to learn.

When the child discovers his hands and feet, his clothes, and the objects around him he soon develops motor skills. His verbal skills begin when he understands what is said to him. A much greater development occurs when he can use the words himself. When he can speak he can ask questions. As skills develop, the child increases his power to learn new things. When he has learned to read, a new tool for learning is available. Having learned arithmetic, he is ready for algebra, then for higher mathematical skills. The learning of these opens up the fields of science. Thus learning has a snowball effect. The more we learn, the better we are equipped for further learning.

Stimulation and Response

Learning requires stimulation. Learned reactions are responses to stimulation. The child touches a hot stove and jerks away his hand. Heat is the stimulus, jerking is the response. With one or two such experiences the child learns not to touch a hot stove. The sense organs and muscular mechanisms, therefore, are of great importance to the learner. Normally the most important sense is vision. Hearing is second in importance and touch is third. People born with neither vision nor hearing are very greatly handicapped. Only through intensive use of their sense of touch can they be taught to take care of themselves.

DETOUR PROBLEM TESTS LEARNING FROM EXPERIENCE AND OBSERVATION



A barrier open at each end separates food or a toy from the subject. The baby (left) persists in trying to get the doll through the glass instead of reaching around the side. The monkey grasps the



solution quickly. The dog observes and imitates the monkey. But the dull-witted chicken will never have sense enough to walk around the end of the fence to reach the coveted corn.

and to communicate with others. Helen Keller is an illustration of what careful training through touch can accomplish in a person who is both blind and deaf.

We learn to put on warm clothes when our temperature sense tells us it is cold. We recognize many objects through taste and smell. Muscular sense (kines-thesia) likewise plays a part. Muscular defects may hinder or prevent the learning of motor skills. As in the case of sensory defects, it is sometimes possible to overcome such handicaps by making unusual uses of the muscles that remain unimpaired.

Once motor skills are acquired, the kinesthetic sense becomes extremely important. After we have learned through vision where the electric-light button is, this sense enables us to go directly to it in the dark. It also accounts for the fact that we can carry on complex motor skills more or less automatically. Driving an automobile or operating a typewriter by the touch system are examples.

Specialized kinesthetic sense organs called receptors are located in the muscles, tendons, and joints. Muscle movements stimulate them, sending nerve impulses into the spinal cord and brain, then back again to the muscles. These impulses provide the succession of stimuli, or cues, necessary to carry on a learned sequence of movements. (See also Muscles.)

Learning and the Brain

Although sense organs and muscles are necessary to learning, the most important structure of all is the brain (see Brain; Nerves). This not only interconnects sense organs and muscles, but its billions of nerve cells somehow retain a record of what has happened to us. How they do this is not known. There are many theories. One scientist likens the nerves of the brain to the wires of a wire recorder. The wire is changed magnetically. This modification then makes possible a "playback" of what has gone into the mechanism. Certain it is that the playback is operated chiefly through the brain.

Learning ability increases as the brain grows in size and complexity. Animals without brains cannot learn much and the little they do learn is not re-

tained very long. The rat has only a small brain, but it learns to find the correct path through a maze, it learns to associate food with certain signs and not with others, and it even learns to solve simple problems which require recall of past experience and elementary reasoning. It also retains what it learns, sometimes for months.

The dog, with a much larger brain, can learn skills and solve problems too complex for the rat. Confronted by a barrier placed between itself and food, the rat will attack the barrier. A bright dog grasps the uselessness of such an approach and makes a detour around the obstruction. This is an example of learning through insight rather than a simple trial-and-error attack.

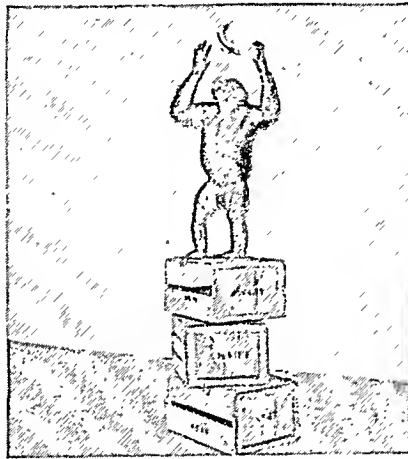
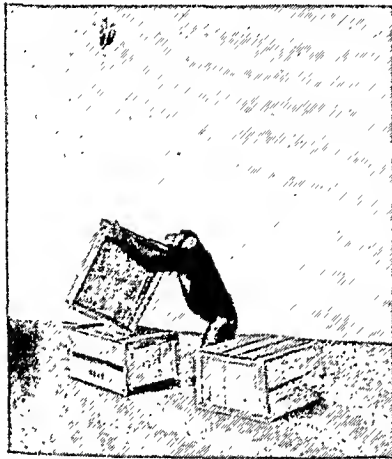
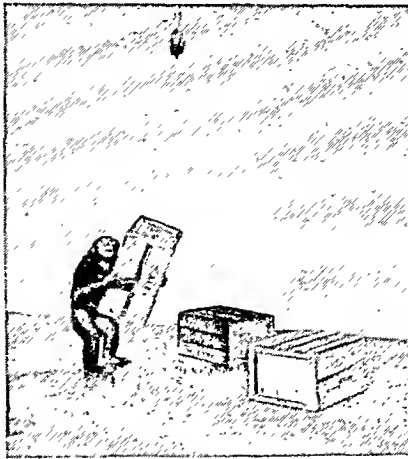
Learning by insight is more evident in the apes, such as the chimpanzee. These animals have brains far in advance of the dog's. Their learning ability is "almost human" because they also have superior sense organs and their fingers possess almost human powers of manipulation. All three superior factors—brain, sensory ability, and powers of manipulation—enable chimpanzees to acquire complex skills and solve involved problems.

Learning ability decreases as a result of brain injury. In general, the loss of learning ability is in proportion to the extent of brain damage. The handicap is greater for complex learning than it is for simpler learning. Injury to the front part of the brain interferes with ability to grasp the meaning of situations and to act appropriately. Insight and reasoning are impaired.

How Learning Is Studied

Many psychological studies of learning are carried on in laboratories with animals, children, or college students as subjects. When motor skills are being investigated, the most widely used apparatus is some form of maze. An animal runs through the maze or along the top of an elevated maze pathway. Human subjects usually trace a smaller maze with a stylus while blindfolded. The animal learns the correct pathway because it is hungry and food is found at

LEARNING BY INSIGHT



The chimpanzee is placed in a cage with a bunch of bananas hanging overhead. He tries to reach the fruit and realizes he cannot. The solution of stacking the boxes and climbing on them shows learning by insight instead of by trial and error.

the end of the path. As it learns to avoid blind alleys, it gets its reward more quickly and with less effort. Experiments have shown that it does not learn unless it has a need and its efforts satisfy this need. Thus nonhungry rats fail to learn a maze when food is the only reward. Make them hungry and they soon learn. Likewise, hungry rats who find no food at the end of the pathway fail to learn. Place food there and the maze is soon mastered.

Learning in human beings also requires rewards. Sometimes this is the knowledge that one is making progress toward mastery of a task. Perhaps his reward is a "well done" from an observer. Children who were given money when they reached the end of a maze pathway learned more quickly and with fewer errors than those given no reward.

Mazes are widely used because a pathway may be arranged which is new to all learners. A fair comparison of the learning performances of different subjects could not be made if some had already had practice. When verbal learning is being studied, subjects are often required to memorize lists of such nonsense syllables as TOJ, XUH, and GIK.

Progress can be followed by plotting a learning curve. Along the base one marks off trials or practice periods. Each trial may be a five-minute practice

period. Along the vertical axis progress in learning is indicated. This may be shown by plotting errors or successes. In a typewriting test, for example, the line may show the number of errors or words correctly typed in five-minute tests.

Plateaus of Learning

When very complex skills are being learned, there is often a period of little or no progress. This is known as a "plateau." Poor motivation may be one explanation for plateaus. In one industrial situation, the average worker reached a level of skill which would enable him to "get by," and he showed no further improvement. When a bonus based upon piecework was offered, however, the average output soon increased.

When motivation is at its highest possible level and methods of maximum efficiency are used, performance often reaches a limit beyond which no further improvement is possible. This is the *physiological limit*. It is reached when the errors cannot be reduced and when the correct movements are made as fast as brain and muscles will allow. Very few people ever reach their physiological limit in any skill.

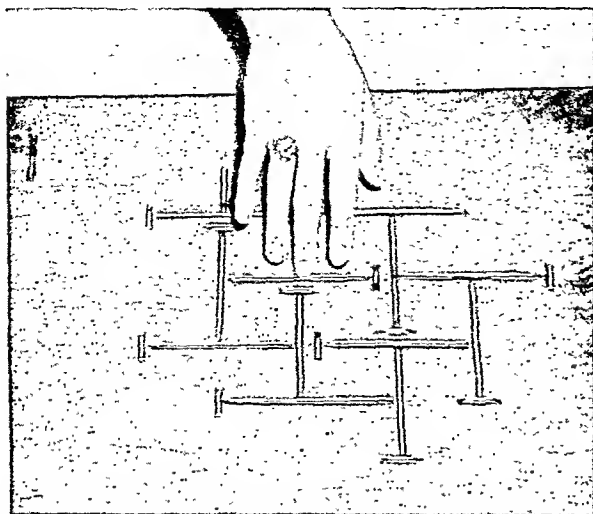
Efficient Learning

Three factors are especially important in learning. Keeping them in mind will greatly improve the effectiveness of learning (see Study).

The first factor is the *principle of rest*. Experiments in the laboratory, in the classroom, and in industrial situations have shown that much more efficiency is attained with frequent rests than with practicing continually for long periods. In general, a one-hour period without a rest is long enough. In the case of intensive study, a half-hour period may be better. If the student spends 15 to 30 minutes getting settled and trying to concentrate on what he is doing, a half-hour study period is largely wasted. In any case, when one finds that he is reacting automatically, going through the motions without grasping what he is doing, it is time for a rest. Continued work without rest will bring diminishing returns. Rest periods need not be long. Often a few minutes may be effective. What happens during the interval is especially important. The best retention occurs during sleep (see Memory). One cannot have a nap between each work period, but he can relax as much as possible. The principle of work and rest applies equally well to learning motor and verbal skills and to study.

The *principle of recitation* should be applied when we try to memorize something. Without recitation

A FINGER RELIEF MAZE



Mazes are used in psychology laboratories to test comparative learning ability. In this test the subject is blindfolded and traces a raised wire pattern with the fingertips.

one merely reads the material again and again until he is able to repeat it. With recitation he reads, then tries to recall. After the first reading or so, he looks at the material only when he is unable to recall some of it. He follows this procedure, with rest periods, until the entire material is recalled.

The third factor is the *principle of whole versus part learning*. In memorizing a long poem, for example, the results of research suggest that one should begin with the entire poem, then concentrate on the verses which give most difficulty. In studying a textbook assignment, also, it is preferable to begin by skimming through the entire assignment, then concentrating on parts which seem to require detailed study. Finally, one should go over the entire poem or assignment again. This might be called the "whole-part-whole" method of procedure.

Learning ability shows its greatest growth during the first 15 to 20 years of life. In the late teens

one has a brain that is about as mature as it will ever be. After we reach adulthood there is a period of about 20 years during which learning ability remains at a high level. Beyond this period it becomes increasingly difficult to learn new things. The slowing down is evident when we attempt to learn entirely new things, as in the case of a person who has never learned mathematics and who now attempts to master mathematical skills. The chief reason for the decline of learning ability in later years is that the brain is no longer as easily modified nor as retentive as it once was.

Transfer of Learning

Learning one skill often helps in learning others. Similarity between tasks is an obvious reason for transfer of learning. To the degree that activities have similar aspects, use similar methods, and follow similar principles one can expect that learning one will aid in learning the others.

Some school subjects transfer a great deal to other subjects. Students who first study mathematics are helped in their study of the physical sciences, which make much use of mathematical symbols, methods, and principles. Latin aids in the study of Spanish because many Spanish words are derived from Latin.

Occasionally transfer is a hindrance. This is sometimes referred to as habit interference. When one has achieved skill in typing by the visual "hunt-and-peck" method, he has unusual difficulty in learning the touch method. He persists in using visual cues when he should be using touch and kinesthesia alone.

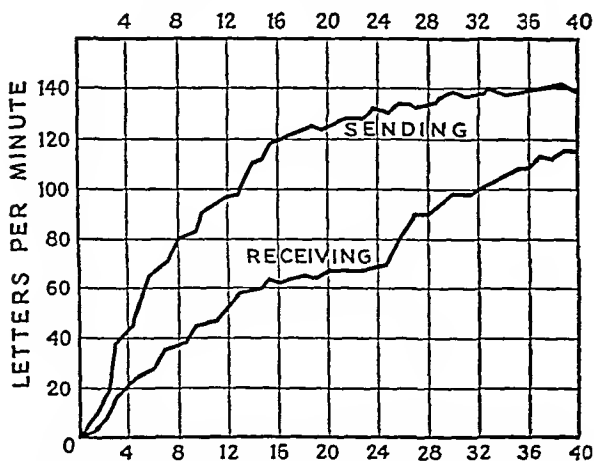
"Discipline" of the Mind

It was once believed that certain difficult subjects, especially Latin and mathematics, "discipline the mind." This concept of transfer is referred to as the "doctrine of formal discipline." Large-scale experiments on high-school students have shown that students who take Latin and mathematics are usually brighter than average to begin with. Thus their superiority cannot be attributed to the subjects studied.

In a carefully controlled study of a large group of high-school students, all students were given a test. On the basis of their scores they were divided into groups of the same average intelligence. They studied certain subjects in common. In addition some groups took Latin, some mathematics, and so on. At the end of the year they were all given another test which would indicate whether any particular study improved their intelligence more than another. The conclusion was against the doctrine of formal discipline. No one study had a general mental effect which differed from other studies.

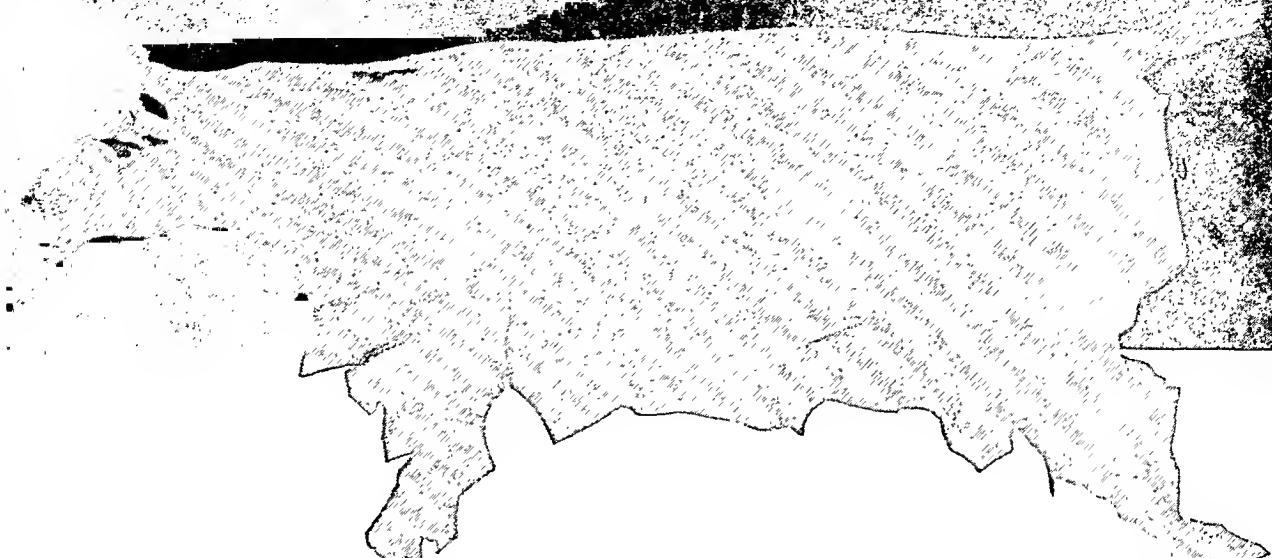
We do not learn merely to improve our minds in any general sense. We learn specific facts and skills. We should acquire habits which aid further learning; information which enriches our everyday lives and helps us to understand the world we live in; skills which enable us to earn our living; and above all, interests to carry us through the later years of life. We begin the learning process in early infancy. It need never stop during the rest of our lifetime.

WEEKS OF PRACTICE



The student of telegraphy, whose learning curves are reproduced here, found more difficulty in receiving than in sending.

HOW HIDES *and* SKINS BECOME LEATHER



LEATHER. Thousands of years ago men learned that the hides of animals could be saved from decay and made tough and pliable by smoking them, or soaking them in oil, or treating them with solutions of various astringent barks.

At first the whole hide, fur and all, was prepared for wear as a garment; but it was soon learned that by removing the hair the rest of the hide could be made useful for many other purposes. Among ancient nations leather-dressing was one of the most important occupations, and a special quarter in many cities was set apart for the tanners—partly, no doubt, because of the disagreeable odor that accompanies the process.

The Hides and Skins That Supply Leather

The hides and skins of domestic animals are the great source of leather supply. The skins of the larger animals, such as cattle and horses, are called "hides"; those of the smaller animals, such as sheep, goats, hogs, and dogs, are called "skins." Hides of small cattle are known as "kip skins." The deer, kangaroo, wallaby, buffalo, ostrich, snake, lizard, alligator, hair seal, walrus, and shark also furnish leather. Reptile skins from the tropics, chiefly those of the boa, python, and water snakes, are made into women's shoes, purses, and similar articles. The United States imports more than half the skins it tans, and over 80 per cent of all types of leather goes into boots and shoes.

Before hides become leather they go through many processes, which are much the same as those employed in ancient Egypt. First the skin is removed from the animals, as nearly whole and unblemished as possible. With modern tools this is done skillfully and quickly; sometimes air is forced under the skin to make re-

THE skins of some 140,000,000 animals are converted into leather every year in the factories of the United States, and from that leather articles worth nearly two billion dollars are manufactured. Think of the immense variety of uses to which leather is put—shoes, gloves, harness, belting, upholstery, bags, suitcases, book-bindings, coats, aprons, and a host of others—and you will realize why it is one of the three most important contributions from the animal world, food and wool being the other two.

moval easy. "Packer" hides are the carefully skinned and preserved hides which come from the meat-packing establishments; the less scientifically handled hides sold by farmers and local butchers are classed as "country" hides and

bring a lower price. If the hides go at once into the tanning process they are left untreated or "green." If there is any delay they must be dried, or "green salted," that is, have salt rubbed into the flesh side to prevent decomposition.

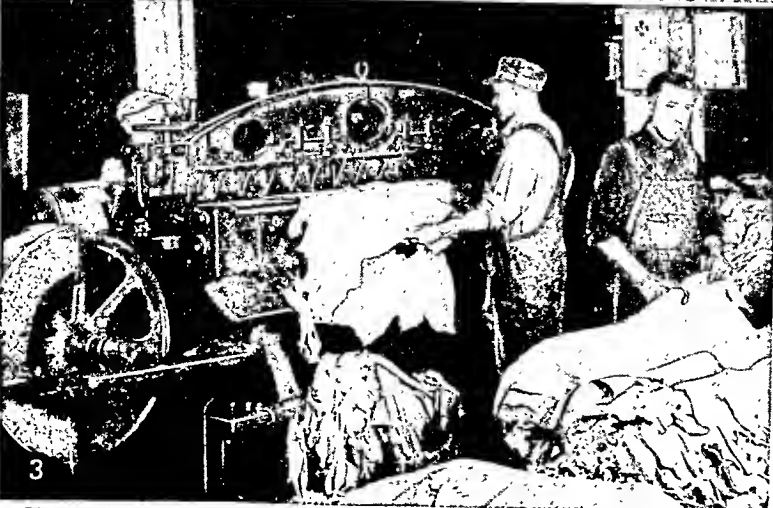
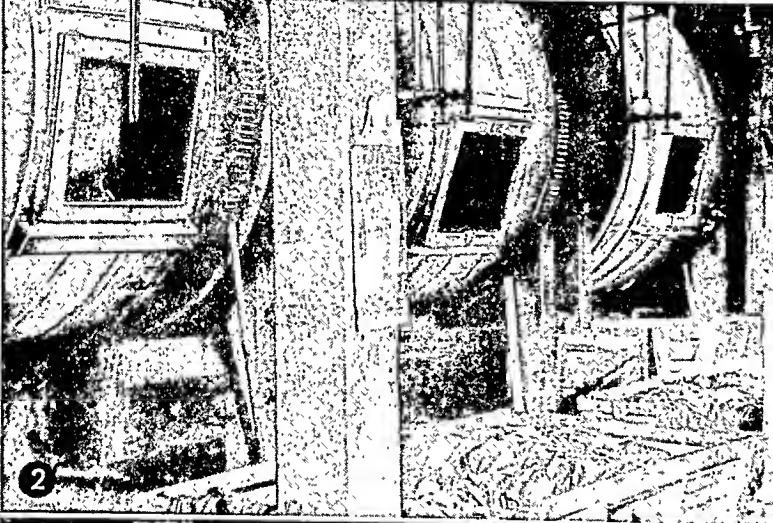
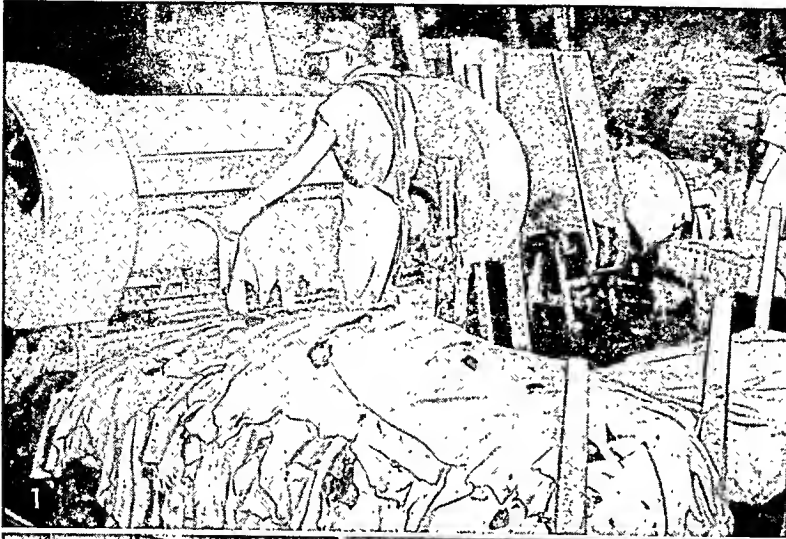
At the tannery the skins and hides are trimmed to remove flesh and useless parts, and put into "soaks"—large tanks of water. Here they are left for from two to four days to swell out and to be softened and cleansed. The "fleshing" machine next removes all fat and tissue. The hair is loosened by a limewater bath and is scraped off by another machine.

How Leather Is Tanned and Why

After thorough washing and trimming the hides are ready for tanning. The purpose of tanning is to prevent decomposition, to make the hides tough and pliable. There is a choice of processes, upon which will largely depend the grade and special quality of the finished leather. The chief processes are the tanbark treatment, treatment with different oils or tallow, and the chrome or chemical process. To tan skins without removing the fur or hair they are "tawed" or dry-tanned by packing in moist salt and powdered alum. Skins treated thus are used for furs or floor mats.

For the heavier leathers and some of the lighter kinds, the tanbark process is in most general use. Barks of many kinds of trees and other vegetable substances containing tannin are used, and the manner

UNHAIRING, TANNING, AND SPLITTING HIDES



1. Hides taken from a lime bath which has loosened the hairs are here being fed into a machine that plucks them out. 2. Next the hides are soaked in a solution that neutralizes the lime, and are then loaded into these big revolving drums where the actual tanning takes place. 3. After tanning the hides are run between rollers to remove excess moisture, and are then fed through a splitting machine like this one and "shaved" to a uniform thickness.

of their use and the choice of barks largely determine the kind and quality of the leather. Most heavy leathers, such as sole and belting leather, upholstery, harness, bag, and strap leathers, are tanned with hemlock and oak. In Australia the acacia or wattle barks are much used. Tannin is also found in the bark and leaves of most forest trees, but only the chestnut provides enough to rank with the oak and hemlock in the United States. Other important tanning materials are *quebracho*, a flourishing tree of South America; *myrobalans*, the fruit of an Indian tree; *divi-divi*, the dried seed pods of a South American tree; *gallnuts*, abnormal growths found on oaks, caused by a gall wasp which lays eggs in the twigs; *gambier*, the product of a shrub cultivated in Singapore and the Malay Archipelago; *mangrove*, from the mangrove trees of Borneo; *valonia*, the acorn cup of the Turkish and Greek oak; and *sumac*, the ground leaves of a plant grown in Mediterranean regions.

The skins are suspended in vats containing tanning solutions made of these ingredients, singly or in combination, and are removed from one vat to another, each succeeding vat containing a stronger solution than the one before. They are then dried by artificial heat, oiled, and ironed by large rollers.

Bark or vegetable tanning requires from 90 to 100 days, while the process of chrome or chemical tanning takes less than a third of that time. This process was invented by an American in 1884, and is now the most general mode of dressing light leathers. It is also used for heavy leathers where great strength is needed. The chromium salts used are taken from chrome iron ore, found chiefly in the Union of South Africa, Cuba, Southern Rhodesia, Turkey, and Russia.

Oil tanning is used for making soft glove leathers such as chamois, buckskin, and piano leather. The process, called *chamoising* ("shammying"), consists of working oil into the skins to make them spongy and soft. Many of the soft leathers formerly treated in this way are now chrome-tanned.

The finishing processes are varied according to the use for which the

leather is intended. The leather as it dries after tanning is stiff and rough. Rubbing oil into the leather to make it soft and pliable is called "currying." Sometimes the currying and finishing are done as a separate industry, the currier buying the rough leather from the tanner. Dull leather, such as is used in the cheaper grades of shoes, may simply be oiled and worked to make it pliable. Harness leather and sole leather are put in great presses to make them hard and durable. If a luster is desired, a dressing is applied to the grain side of the leather and then it is run through pressure rollers which polish the surface; if a dull polish is desired a revolving brush is passed over the surface. Grain leather may also be given a pattern by embossing.

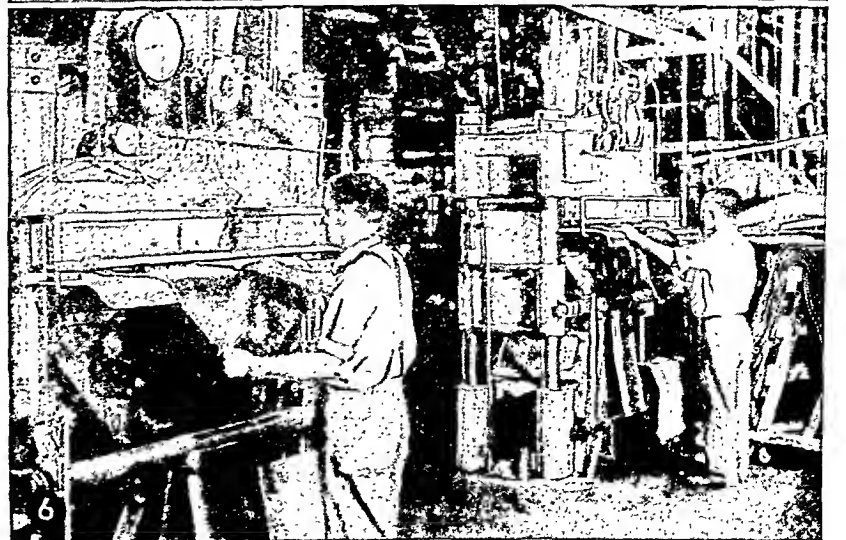
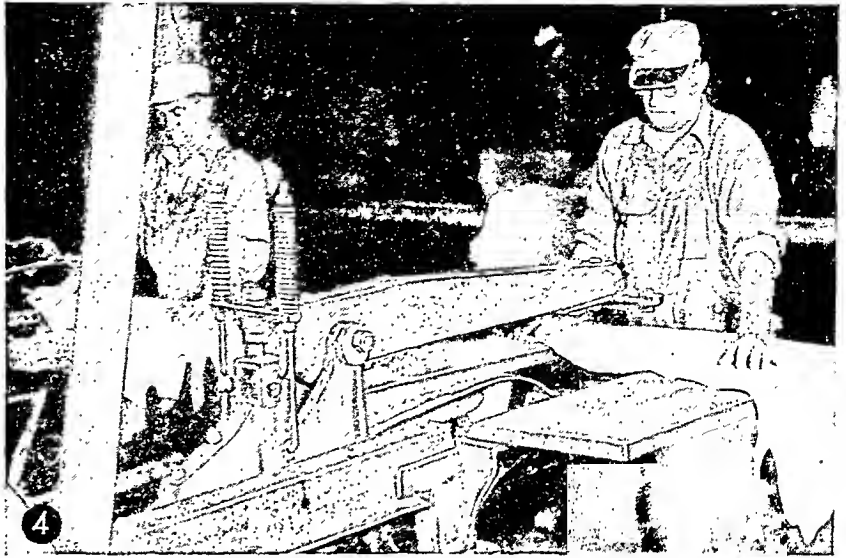
The coloring of leather is an art in itself, requiring great care to bring about a uniform result. Different skins going through the same color bath will be of different shades, and various portions of the same skin may take the color unevenly so that the leather may appear spotted.

The modern factory aims to eliminate all waste. The small pieces of leather chipped off in trimming the hides for market are combined with some of the substances used in the course of the tanning, and made into a pulp that will harden into any required shape or into boards to be cut into shoe heels and inner soles. The tissues and scraps cut from the untanned hides are used for glue, and the hair is sold for making cheap blankets and cloth, or is mixed with quicklime and sand to make rough plaster.

Leathers are distinguished by many names according to their material and treatment. The most numerous and useful are made of cowhide and calfskin, which furnish more than 70 per cent of the total leather supply of the United States. *Box calf* is calf leather stamped with irregular lines forming rough rectangles. *Wax calf* is heavy calfskin with a wax finish. *Ooze* or *suède* calfskin (sometimes kid) is finished by "buffing" or grinding the face on an emery wheel. *Dull calf* or *gun-metal* has a smooth unglazed finish.

About 25 per cent of the leather supply is furnished by the skins of

MASSAGING, DRYING, AND EMBOSsing THE LEATHER



4. After being hung on poles to dry in a heated tunnel, the hides now come to these staking machines. Blunt steel blades on elliptical arms soften the leather by massaging it. 5. The leather is then tacked to frames so it may be completely dried without wrinkling. 6. After being trimmed of irregularities and tack holes, the hides are then ready for embossing machines, such as those pictured here. These are hydraulic presses which imprint or stamp various grains into the leather.

sheep and goats, which are used chiefly for shoe uppers and gloves. Kid or goatskin (all imported) is the usual material for women's and children's shoes. *Glazed kid* is the most common form, having a smooth highly polished surface. *Vici kid* is a proprietary name or trade-mark for a chrome-tanned glazed kid. *Undressed kid* is a skin dressed only on one side, used chiefly for gloves. Heavy plump goatskin, tanned by a combination vegetable and chemical process and having a semibright finish, is called *Dongola*. *Morocco* was originally a sumac-tanned goatskin, made in Morocco and stained red; the term is also applied to imitations of morocco, also to any heavy tanned goatskin.

Russia leather was originally a very high-grade calfskin made in Russia and dressed with birch oil, which gives it a peculiar fragrance; it was dyed a deep red. So-called Russia leather is now made throughout Europe and America of heavy skins of various kinds, and finished in tan, brown, or black. *Red Russia* is now chiefly used for binding fine books, as the leather is watertight and strong and repels insects. *Patent leathers* are made from any firm soft leather, free from grease and with no tendency to stretch. Successive coats of black varnish are applied, until the surface is covered with a heavy coat of enamel, and the last coat is baked on. *Cordovan* is horsehide,

HAND-FINISHING LEATHER FOR SPECIAL QUALITY



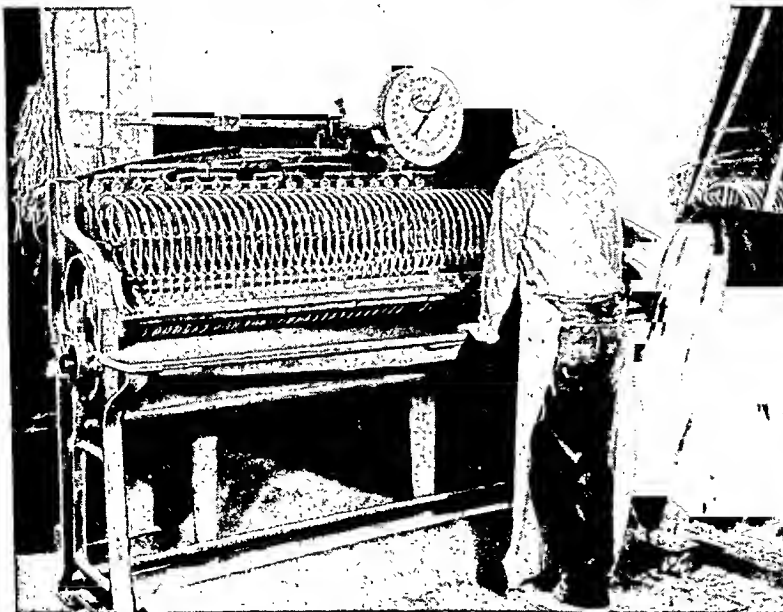
In the ordinary color bath process, hides often color unevenly. This must be avoided in special orders for fancy leathers. Here we see men carefully coloring a hide by hand. By this more laborious method, absolute uniformity of color will be assured.

very durable and watertight; the name comes from the Spanish city Córdoba, which had an ancient reputation for making fine shoes. Imitations are now made from calf. *Chamois* is properly the dressed skin of the Alpine chamois, but the genuine article is very scarce; most so-called chamois is now oil-tanned sheepskin. *Buckskin*, originally tanned deerskin, is now usually suede-finished calf or kid. Soft and pliable, it is widely used in glovemaking. *Pigskin* is a fine durable leather much used for luggage and small articles. *Ostrich hide*, with its attractive widely spaced "eyes," is also used for small pieces. For luxury items of many kinds the reptile leathers are favorites—alligator, lizard, and snakeskin. Leather made from the skin of the salmon is sometimes used for small items.

Leather Substitutes

Because of the increasing demand for leather and its consequent rise in price, various substitutes have been devised. Some of these so-called "artificial" or imitation leathers closely resemble leather in feel and appearance, while others take the place of leather only in a utilitarian sense, differing more or less widely in appearance and texture. A good imitation leather or leathcrete is made of strong fabrics coated or ground together with plastic compounds. Scrap leather may be included in the mixture, or wood pulp, or some other insoluble ingredient.

GETTING THE EXACT MEASUREMENT OF EACH HIDE



Since leather is sold by the square foot, the exact area of each hide must be known. The little wheels of this measuring machine register the total area accurately on the dial above, and the number of square feet are marked on the back of the hide.

ALL ABOUT LEAVES *and* THEIR USES *to* PLANTS

*They Serve as Mouths, Stomachs, Pores, and Lungs and in Helping Themselves
They Help Us, for They are the Original Source of Nearly All Our Food,
Even Such Things as Bacon and Eggs*

LEAVES. Most people look upon leaves merely as the brilliant costume of the trees without realizing their immense importance to human as well as to plant life. It may be surprising to learn that by far the largest part of the food you eat is manufactured originally by the leaves of plants, even your breakfast bacon and eggs if you follow them back far enough. Indeed, we shall see that leaves are the mouths, the lungs, the stomachs, the pores, and the "eyes" of the plant, without which the plant could not live and grow.

We can learn all the more important facts about leaves by examining any ordinary leaf from a tree or bush. From the stem a network of veins branches out to all parts of the leaf. Those veins act not only as the fiber skeleton which holds the leaf spread out in shape, but as the "blood-vessels" which connect every portion of the leaf with the deepest rootlet far away underground. In between the veins, the leaf is filled with a spongy mass of green-colored cells, held in place by a thin skin or membrane on the upper and lower surfaces.

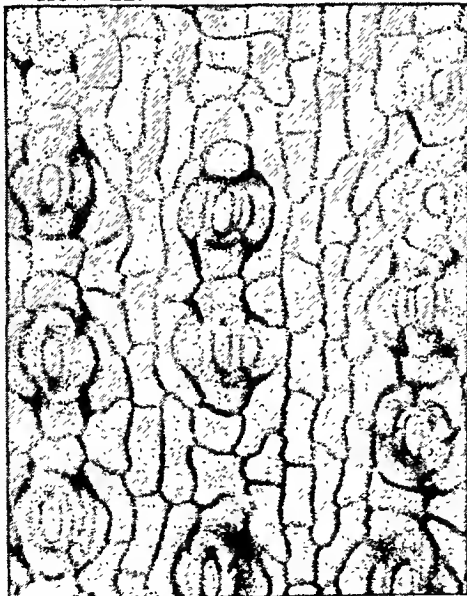
Now let us follow the leaf through a day's work as it hangs upon the tree. First, we will find that the upper surface nearly always faces toward the sunlit sky. If a tree is growing close against a high wall, very few leaves will be found on the dark side. That is because the leaf needs sunlight to do its work. There are a few interesting exceptions to this rule, however, such as the compass plant, whose leaves are turned on edge



Trees with thick foliage, like the horse-chestnut shown here, almost always have leaves of the "split" variety—that is, each leaf is split up into several parts so that the sunlight can pass between them and reach the leaves beneath.

leaf takes from the air a substance called carbon dioxide, and mixes it up with the water from the distant roots. Then, with the aid of the sunlight,

HOW LEAVES EAT AND BREATHE



This is the epidermis of a leaf highly magnified, showing the eating and breathing pores open. These stomata, as they are called, not only serve as mouths, but as pores through which the leaf sweats and so keeps cool in spite of the heat of the sun.

pointing north and south, to avoid the too intense heat of the sun in the dry hot regions where it grows (see Compass Plants; Eucalyptus).

As the sunlight strikes through the smooth transparent membrane on the upper surface of the leaf, small quantities of air enter through thousands of tiny "mouths" (stomata), mostly on the under side. A strange process (photosynthesis) now takes place. The green coloring matter (chlorophyll) of the

leaf manufactures out of this mixture the sugars and starches which are the basis of plant food, and turns out into the air again through those same "mouths" the surplus oxygen. The sugars and starches then pass back through the veins and stem of the leaf, and unite with other chemicals in the sap to nourish the plant and build up the hard woody material (cellulose) of the stem and branches (see Cellulose).

But the leaf performs another important function. When they are not drawing in air to help make food, the "mouths" turn into "pores" and perspire away the excess water sent up from the roots. This helps to keep the leaf cool and healthy, in spite of the burning rays of the sun.

In a sense the leaf "sees" the light, for the leaves of a plant growing in a cellar will keep turning toward the windows, no matter how often the position of the plant is changed. There are, in fact, what corre-

spond to eyes on the upper surface of a leaf—that is, tiny cells covered with curved transparent membranes like the lenses in a telescope or camera. It has been shown that if a film of water covers the upper surface of certain leaves, so as to destroy the focusing effect of these tiny leaf-lenses, they appear to be no longer able to determine the direction of the light. The leaves of some plants are sensitive to touch as well as light. (See also *Life; Plant Life.*)

Plants show a wide range of leaf shapes, each suited to particular needs. But they may all be divided into three classes according to the arrangement of the main ribs of their skeleton: (1) those with several main ribs branching out finger-like from the stem, called "palmate" (from the Latin meaning "palm of the hand"); (2) those with a single large middle rib from which smaller ribs branch out feather-like on each side, called "pinnate" (from the Latin meaning "feather"); and (3) those in which the ribs do not form a branching network at all, but run straight from the stem to the tip, called "parallel veined."

The great differences in the outlines or outer shapes of leaves are mainly due to the extent to which one or the other of these three types of skeleton frame-works are filled in with the green cell-tissue. For instance, the round nasturtium leaf, the slightly indented leaf of the scarlet geranium, the ivy leaf with its sharp lobes, and the leaf of the horse-chestnut, which is split into sections clear down to the stem—these are all of the palmate type, with different quantities of flesh on their bones, so to speak. Similarly the beech leaf, the oak leaf and even the locust leaf, which consists of groups of pairs of

small leaflets arranged around the main stalk, are all examples of the pinnate type. Lilies, tulips, and almost all grasses illustrate the third or parallel-veined type of leaves.

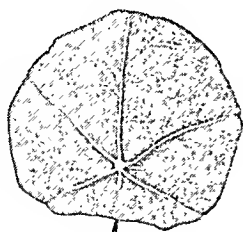
Leaves are arranged in such a way as to get the greatest possible amount of light; they may be in pairs (opposite), or in spirals or zigzags about the branch (alternate), but no leaf will ever closely overlap another.

The normal form of the leaf is broad and thin, but there are many modified leaves that you would not be likely to think of as leaves at all—the needles of the pine tree, the long ribbon streamers of giant seaweeds, the fronds of ferns, the tiny hairs of mosses, the hollow traps in which the pitcher-plant catches insects. Even the sepals and petals of a flower are modified leaves, though they have come to play a very different role from that of the true leaves. The leaves of water-plants show many interesting differences from those of land plants (see *Water Plants*).

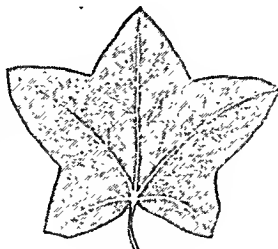
Collecting leaves, either for their colors in the fall, or for their different forms, is a fascinating pastime. They can be easily pressed out flat, labeled in ink, right on the leaf itself, and mounted in a blank book. Just try beginning a collection this summer, and see how soon you will know every tree and shrub in your part of the country.

In the autumn the leaves of deciduous trees deck themselves in gorgeous crimsons, purples, browns, and golds. These remarkable displays of color are the result of life changes taking place in the trees themselves. The tree is thrifty and a good manager, and when it feels the approach of autumn,

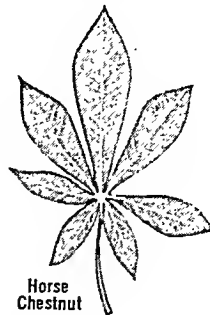
HOW NATURE PLAYS WITH LEAVES



Nasturtium



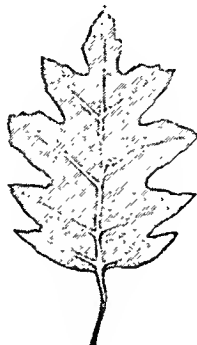
Ivy



Horse Chestnut



Elm



Oak



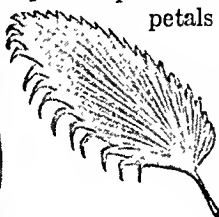
Locust



Grass



Lily of the Valley



Fan Palm

Leaves are classified according to the pattern of their "veins." Each of the rows here contains leaves of the same class, although the outlines differ radically. Those in the top row, for instance, are characterized by veins branching from a common center. They are called "palmate" from the resemblance of this pattern to the palm of the hand with its branching fingers. The Nasturtium leaf, as you see, has an almost unbroken round outline, the Ivy is cut into star-shape, while the Horse Chestnut is cleft between the veins all the way down to the stem. The leaves in the middle row are of the "pinnate" variety so called because of the resemblance of their vein pattern to a feather (Latin, *penna*). Notice that the veins in each of them branch out from a middle rib. In the case of the Locust the cleft between the ribs is carried to the extent of making each leaflet look like a separate leaf. At the bottom we have leaves of the "parallel-veined" type, in which each vein starting at the base, runs to the tip without network or branching.

color are the result of life changes taking place in the trees themselves. The tree is thrifty and a good manager, and when it feels the approach of autumn,



Direct-color photograph

By John Kabel

THE RED AND GOLD OF AUTUMN LEAVES

Like the flaming bush that appeared to Moses, a red maple rises here from among the evergreens and seems to blaze against the blue sky. A group of quaking aspens forms a golden background for this autumn scene, which was photographed along a roadside in northern Ohio.

it puts on a thicker coat of bark over its twigs and prepares for the loss of its leaves.

Scientists are not sure how the change takes place, but this much is certain: normally the leaf is filled with chlorophyll. When the tree's life slows down, the leaves contain less chlorophyll and the other coloring pigments get a chance to show their colors. Among them are the derivatives of *carotene*, the substance which colors carrots. The dyestuffs called *anthocyanins* (reds and purples) and *flavones* (yellow) always are present in a leaf. These substances give leaves their gorgeous autumn colors.

Meanwhile, glucosides, which start as simple sugars (see Sugar), circulate in the sap and bind to themselves compounds which otherwise might poison the tree. To prevent the loss of sap when the leaf falls, a corky layer grows between the twig and the leaf stem. (See also Trees.)

Most leaves consist of two distinct parts: the *petiole*, or stalk, attached to the stem, and the thin expanded portion called the *blade*. Sometimes there is no petiole and the blade is attached directly to the stem. Many leaves grow from between a pair of small appendages called *stipules* attached either to the base of the petiole or to the stem. Some stipules remain attached during the life of the leaf, as in the apple. In the grasses the lower part of the leaf folds around the stem for some distance and is called the *sheath*.

If the leaf consists of a single blade it is called *simple*. If it is divided into two or more distinct parts (called *leaflets*) the leaf is *compound*. The green pulpy substance of a leaf is called the *parenchyma*; the outer layer of cells is the *epidermis*. Both are examples of plant tissue. (See also Plant Life.)

The HERO of the SOUTHERN CONFEDERACY

LEE, ROBERT E. (1807-1870). The Confederacy's greatest soldier, Robert E. Lee, once wrote to one of his sons: "Duty is the sublimest word in our language. Do your duty in all things . . ." When the general was an old man, a mother brought her baby to him to be blessed. As Lee handed the child back, he said: "Teach him he must deny himself."

Duty to others and discipline of self—these were two of the strongest traits in Lee's character. If he was not born with them, he acquired them early from his family and his Virginia environment. The Lees were living at Stratford, their ancestral home in Westmoreland County, when Robert was born on Jan. 19, 1807. Robert was the fourth of five children.

The Lees were an old and honored family and held substantial property. Several of Lee's forbears had played distinguished roles in Virginia's history. His father was the famous Revolutionary hero "Light-Horse Harry" Lee, the friend of Washington. The class into which Lee was born believed that its members were natural leaders and had an obligation to serve society. They lived according to a code which set higher requirements for themselves than for others. Shortly after Lee's birth, the family moved to Alex-

LEE, RICHARD HENRY (1732-1794). On June 7, 1776, Richard Henry Lee offered the resolution in Congress "that these colonies are, and of right ought to be, free and independent states." Lee's fame rests on this history-making resolution, but he served his country well in many other ways.

Lee was born Jan. 20, 1732, in Virginia. At 25 he took a seat in the Virginia House of Burgesses. During the troubled years before the Revolution Lee opposed the harsh rulings of the British ministry. He was among the first to suggest that the colonists organize committees of correspondence to achieve unified action. These committees opened the way for the Continental Congresses of 1774 and 1775, of which Lee was an active member. He was a signer of the Declaration of Independence and served as president of the Continental Congress under the Articles of Confederation from 1784 to 1786.

In 1787 Lee, opposed to the idea of a new Constitution, declined an appointment to the Constitutional Convention. When the Constitution was submitted to the people for adoption, he and Patrick Henry were its most violent critics. They feared that it would deprive the states of their rights and that it might become an instrument of tyranny. Lee's pamphlets opposing its acceptance, entitled 'Letters of the Federal Farmer', had wide circulation.

After the Constitution was put into operation, Lee realized that any changes in it would have to come through the system of amendments. In 1789 he accepted appointment as senator from Virginia. In the Senate he was one of the strongest advocates of the first ten amendments, the Bill of Rights. Ill health forced him to retire in 1792. He died June 19, 1794.

andria, near the nation's capital, where the tradition of George Washington lived on. Washington, also a man of duty and discipline, was young Lee's hero. Like Washington, Lee set out even as a boy to live by high standards. His early surroundings helped shape him into the man he became.

Partly because of the military tradition in his family and partly because an army career was attractive to Southern boys, young Lee decided to become a soldier. He entered West Point and was graduated in 1829, standing second in his class. Like most students at the military academy, he specialized in military engineering, and for several years after graduation he supervised various construction projects for the army. His duties took him to Virginia, Washington, D.C., St. Louis, and New York City. On June 30, 1831, he married Mary Custis, great granddaughter of Washington's wife and the heiress of the magnificent estate of Arlington across the Potomac from Washington. During the following years, the Lees had seven children.

Experience before the Civil War

Lee's application to his work won him promotion to the rank of captain. His first experience in actual

GENERAL ROBERT E. LEE



battle came in the Mexican War. He was one of a group of young engineer officers on the staff of Gen. Winfield Scott, the general in chief of the army. Scott headed an army which landed on the east coast of Mexico and moved inland to capture Mexico City, the capital. The commanding general used the engineers to scout out the enemy positions, and he relied heavily on them for tactical advice. Lee was the ablest of the engineer officers and served with distinction in all the operations of Scott's victorious campaign. He came out of the war in 1848 with the brevet rank of colonel. More important, Scott had marked him as an officer with a brilliant future.

After the Mexican War, Lee's next big assignment was as superintendent of West Point. From the academy, he went to Texas in 1855 as lieutenant colonel of the Second Cavalry Regiment. Here he served several years, policing the border areas against Indians. In 1859 he was home on leave when the abolitionist John Brown tried to start a slave uprising at Harpers Ferry in Virginia. Lee led a party of Marines from Washington which captured Brown and his band. He returned to Texas for a short tour of duty but was recalled to Washington early in 1861. The secession movement had started. Some Southern states had left the Union, others were about to go. Lee's own Virginia was considering secession. The possibility of civil war was in the air.

Lee's Fateful Decision

Old General Scott, loyal to the Union, was too infirm to be active if war came. He wanted Lee near him and offered the colonel an important command in the national army. Lee had a momentous decision to make. Should he accept Scott's offer and stay with the nation or go with his state, which was obviously going to secede? What was his duty? Lee loved the Union, and he was saddened and dismayed by the prospect of its being broken up by Southern action. At the same time, he could see little attraction, as he put it, in a Union that had to be held together by force. In the end, his course was determined by his devotion to his state. As much as he venerated the Union, he was first of all a Virginian and loved the Old Dominion. He could not bear to think of a national army invading Virginia to coerce it back into the Union or of himself as possibly leading that army. After days of deliberation, he decided his right course was to resign his commission, return home, and offer his services to Virginia. His action has been called the decision he was born to make.

Virginia had seceded from the Union but had not yet formally joined the Confederacy when Lee reached Richmond. The state appointed him commander of the Virginia military forces then being gathered. At this time, Lee was 54 years of age and a splendid figure of a man. He was about five feet eleven inches in height and weighed 175 pounds. He seemed larger than he actually was because of his massive head and wide shoulders. His face was ruddy, his eyes were brown, and his dark wavy hair was beginning to show marks of gray. In manner, he was grave, some-

times reserved, and always kind. His dignity, like that of Washington, repelled familiarity.

After Virginia joined the Confederacy, the capital of the new Southern nation was established in Richmond. The Confederate government took over the direction of all military forces in Virginia, including Lee's state troops. Although Lee was made a full general, he was a general without an army. For a time he acted as a military adviser to the president of the Confederacy, Jefferson Davis. Finally the president sent him to repel the Federal forces that were invading western Virginia, the mountain region that would be the future West Virginia. Lee failed to halt the Federal advance. He was then ordered to South Carolina and Georgia to construct coastal fortifications.

Lee was recalled to Richmond early in 1862 and appointed by Davis to be general in chief of all Confederate armies under authority of the president. His title was important, but his position was not. Davis kept the direction of the war largely in his own hands and entrusted only minor matters to Lee. In reality, Lee was primarily an adviser again. Soon after he took office, a large Federal army approached Richmond from the east and penetrated to the gates of the city. In the fighting before the capital, the commander of the Confederate army was seriously wounded. Davis appointed Lee commander of the famous organization known as the Army of Northern Virginia. Lee's great military career was about to begin.

Command in the Field

As the commander of a field army, Lee found his true place in the war. If there can be such a person as a natural field general, he was one. He was aggressive and combative. In his strategy, he was original, sometimes brilliant. Realizing that the weaker side must take chances, he was daring. His character and personality aroused the devotion of his men, who called him "Marse Robert." He was big enough to take the blame for failure, as when after Gettysburg he said: "It is all my fault." He knew how to handle his generals and make them work as a team.

Lee demonstrated many of his military characteristics soon after he assumed command in June 1862. The Union army, under the command of General McClellan, was a few miles from Richmond and astride the Chickahominy River before the city. Lee decided to mass his army and attack the smaller part of the enemy army on the north side of the river. He hoped to destroy this fraction and then smash the Federals on the south side. He took the planned risk that McClellan would not discover there was only a small defending Confederate force directly in front of Richmond. Lee was partly successful in the battle of the Seven Days that followed. He drove the Union army back about 25 miles but was not able to destroy it.

The Union government then withdrew McClellan's army to northern Virginia to regroup it with the smaller force of General Pope. Lee hurried northward to hit Pope before McClellan could arrive. In August he fought Pope, who had received some of McClellan's troops, at the second battle of Manassas. Again mak-

ing a daring plan, he divided his army and sent part of it around to Pope's rear. Following with the rest of his troops, he defeated the confused Pope and drove him back into Washington. Lee next decided to invade Maryland, a state which had not seceded. His object was to get the armies out of Virginia during the harvest season and possibly win a victory in a Union state. McClellan, in command of the Union forces again, moved to meet him. The two met in September at the battle of Antietam, where McClellan attacked Lee but failed to break his lines. Lee, realizing that he was in a dangerous position and far from his supplies, retreated and took up a defensive position behind the Rappahannock River in northern Virginia. Here General Burnside, who succeeded McClellan, attacked Lee in December at the battle of Fredericksburg and met a bloody repulse. As the year 1862 closed, Lee had given the Confederacy its greatest victories and had become the idol of the Southern people.

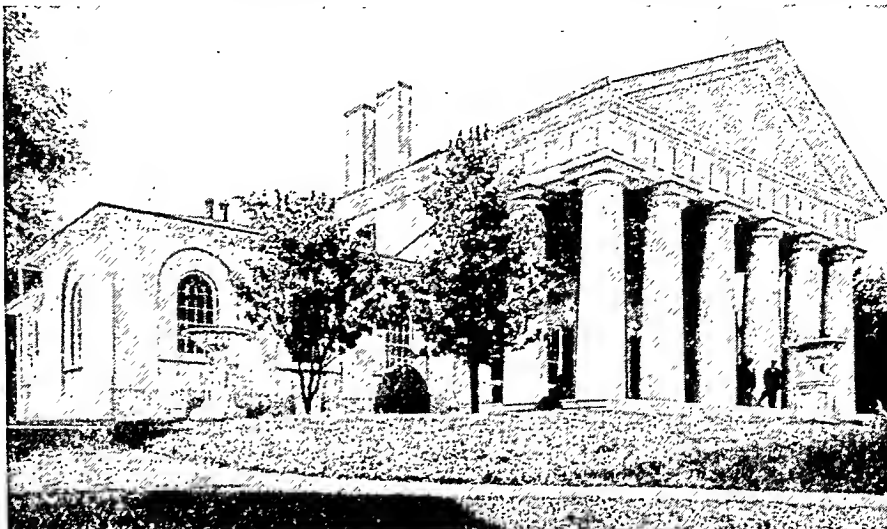
In the spring of 1863, General Hooker, the new Federal commander, crossed the Rappahannock above Fredericksburg to attack Lee's left flank. When Lee confronted him, Hooker drew back. In Lee's most daring move of the war, he sent Stonewall Jackson to turn the Federal right while he attacked from the front. His objective was to cut the Federal army in two and destroy it. In this engagement, the battle of Chancellorsville, Lee hit the Federals hard, but they managed to withdraw across the river.

After Chancellorsville, Lee started an offensive movement he hoped would win the war—an invasion of Pennsylvania. In the southern part of that state, he met the defending Federal army at Gettysburg in a three-day battle, July 1-3, the greatest ever fought in North America. On the second and third days Lee threw strong attacks against the Union lines and was repulsed with heavy losses. He has been criticized for his action at Gettysburg in attacking a larger army in a strong position. (He had about 75,000 men to the 88,000 Federals.) However, it must be remembered that he had great faith in the fighting ability of his men and that even the best generals in the Civil War did not understand that the firepower of the new rifles was making frontal attacks dangerous to attempt. (See also Gettysburg.)

The Last Campaign

After Gettysburg, Lee fell back into northern Virginia. For the rest of the war, with an army ever getting smaller, he had to employ a defensive strategy. In the spring of 1864, General Grant assumed direction of the Federal army in Virginia. His ob-

THE LEE MANSION ON THE POTOMAC RIVER



At Arlington, Va., stands the Lee Mansion, where the Lees lived from 1831 to 1861. Lee's wife had inherited this beautiful stucco-covered brick house from her father. Restored as a museum and national memorial, it was opened to the public in 1925.

jective was to bring Lee to battle in northern Virginia and to destroy the Confederate army. Lee showed great skill in this campaign. He evaded attempts to trap him into decisive battle and inflicted heavy losses on Grant at the battles of the Wilderness, Spotsylvania, and Cold Harbor. Finally Grant swung south of Richmond to Petersburg, hoping to reach the railroads which carried supplies to Lee's army and make Lee fight there. Lee got to Petersburg first. Grant then decided the only way he could get at Lee was by the slow method of running siege trench lines around to the railroads in Lee's rear. Grant started his siege in the summer of 1864. Not until the spring of 1865 did he seize the railroads. Lee then abandoned Petersburg and Richmond. He retreated to the west, but Grant was right on his heels. With only 25,000 men left, Lee realized that his cause was hopeless. To continue fighting meant the needless loss of lives. Early in April he met Grant at Appomattox and surrendered the Army of Northern Virginia.

In the years after the war, Lee was the hero of the South. With dignity and without bitterness, he accepted defeat and preached to his people the necessity of peace and national unity. Offered many jobs, he accepted the presidency of Washington College at Lexington, Va. Later it was renamed Washington and Lee. It was his duty, he thought, to guide the youth of the South in the postwar years. He died on Oct. 12, 1870. In his last hours his mind went back to the war, and his last words were: "Strike the tent." His body rests in a mausoleum in the college chapel.

LEECH. The leeches are bloodsuckers which belong to the worm family. Like many worms, they have soft, flat bodies divided into segments. At each end is a rounded sucker, a large one at the tail end and a smaller one where the mouth is. Most leeches live in the water, where they attach themselves to fishes, turtles, and frogs, and even to persons who go in swimming in ponds and brooks and to cattle which come

down to drink. They fasten themselves with their hind sucker; then with the mouth sucker they suck up the blood through three little holes which they make in the skin with their sharp teeth. Leeches swim well, curving their bodies like eels and moving with the pointed tail end foremost. A few leeches live on land. These are found chiefly in the damp forests of Asia and are terrible pests.

The stomach of a leech extends throughout almost the entire length of the body and has numerous little sacs along its sides. These greatly increase its capacity, so that the leech can swell out its body with the blood it has sucked almost as if it were made of rubber. One meal may last for several months. Leeches were formerly used a great deal by physicians for drawing off or "letting" blood from feverish patients, but they are little used today.

Along the body the leech has rows of little sense organs, which look like pimples. These detect the temperature of the water and the presence of food or enemies. Near the head these sense organs are modified as eyes.

There are two common species of leeches. The *horse leech* is jet black, but in the bright sun it may have a brownish tinge. It grows sometimes to the length of six or eight inches. The smaller *medicinal leech* is cross-barred with brown and black. This kind is most often found in clear running streams attached to the under side of stones. Turtles often have leeches attached to the fleshy underparts of their bodies. The scientific name of the medicinal leech is *Hirudo medicinalis*; of the horse leech, *Aulostoma gulo*.

LEEDS, ENGLAND. For centuries England has been noted for the quality of its woolen cloths, the manufacture of which centers in Leeds. This is one of the largest cities in England and next to Sheffield the largest in the great industrial county of Yorkshire.

Leeds owes its commercial importance to its transportation facilities and its situation on the edge of the great Yorkshire coal fields. The river Aire connects it with the east coast, and the Leeds and Liverpool Canal provides cheap transportation to the west

coast. The iron manufactures are nearly as important as the woolen. In the manufacture of boots and shoes, felt, ready-made clothing, artificial silk, glass, and pottery, Leeds also ranks high. Linen making from flax grown in the Yorkshire region is another important industry. The city is also noted for its fine university and for the great music festival which is held there every three years.

A suggestion of its history, which goes back many centuries, is preserved in the ruins of Kirkstall Abbey—a Cistercian foundation of the 1100's. Population (1951 census, preliminary), 504,954.

LEIPZIG (*līp'sīg*), GERMANY. One of the largest cities in Germany, Leipzig grew up around a Slavonic castle, named Libzi, in the 11th century. The name gradually changed to Leipzig.

Its location made it a natural trade center. It lies at the junction of the Elster and Pleisse rivers in the middle of the broad German plain at the crossing of two ancient trade routes. Leipzigers furthered their natural advantage by establishing a great medieval fair and by building good roads to encourage calls by traders. The fair was renewed after World War II.

The city became the capital of Saxony and the economic and cultural center of the German Midlands. It also became the heart of the great German book trade. As a music center it won world fame. It was the birthplace of Wagner and the home of Schumann and Bach. Bach was organist at St. Thomas church. Mendelssohn-Bartholdy helped found the Academy of Music.

The University of Leipzig, founded in 1409, became a great center of German education. It was heavily damaged in World War II. In 1519, in the "Leipzig Disputation," Martin Luther and John Eck held a public debate on Christian doctrine.

Leipzig's history is stormy. It suffered six sieges in the Thirty Years' War. Napoleon met defeat here in 1813. In World War II, the Allies bombed it as a munitions center and rail hub. American troops took it in 1945; but it was included in the Russian zone. Population (1946 census), 607,655.

LEISURE, a Gift of MODERN LIVING

LEISURE. The problem of leisure is new. During the centuries that led up to recent times, men were expected to work to the limit of their bodily strength. In every age there were a privileged few who had leisure, but most men had to work 12, 14, or even 16 hours a day, six days a week. As late as 1840 the average factory worker labored 72 hours a week. "Sunup to sundown" was the farmer's working day, or as another phrase puts it, "from can to can't."

Today the average worker in a store, an office, or a factory spends about 40 hours a week at his job. Dividing his whole week of 168 hours into 40 for work, 56 for sleep, 28 (four each day) for eating and personal care, he has 44 hours a week left as leisure time. His wife and children have at least as much leisure time after their tasks are done.

This new leisure has been created by the big improvements in all the methods of production that supply man's needs. Aided by new machines and scientific developments, men have increased their output of goods and services for each hour of work and they need work fewer hours. Today, working a 40-hour week, men enjoy a higher standard of living than when they worked 72 hours a week. It has been estimated that if modern men, with present-day machines and methods, accepted the living standard of 1870, they would have to work only five hours a week to achieve it. (See also Industry, American.)

The wise use of leisure time is an important problem for everyone, young or old. It is a particularly difficult problem for the sick, the aged, and those who have retired from earning a living. These people

have so much leisure that it is hard for them to find interesting and worthwhile ways to use it.

However short the work week becomes, work is still the most important part of life. We do not work to get leisure and the pleasures leisure brings us; rather we use leisure wisely so that work itself can become rewarding and enjoyable. The feeling of success at doing one's daily work—whether it is a job, maintaining a home, or going to school—depends largely on coming to it each day with renewed energy and active interest.

Leisure and recreation go together, although they are not necessarily the same thing. "Recreation" has an obvious meaning. It is the kind of leisure activity that brings "re-creation" or refreshment of strength and spirit. When one speaks of making good use of leisure, he means choosing recreational activities which contribute to health, growth, and spirit.

A recreational activity may be a strenuous sport or a quiet hobby. It may only be a passing diversion or it may be simply an escape from care. It may be an earnest attempt to master a new skill or to help those who are in need of help. Recreational tastes differ among people; what is fun for one person may be exhausting to another. Whatever the particular choice of recreation may be, its function is to keep a person fit for his daily work.

Guiding the Child's Leisure Activities

Children need guidance in their recreation as much as they do in schoolwork or in developing good personal habits. Children welcome properly given guidance because it means new fun and new experiences. A child's leisure activity—reading, a handicraft problem, or a game—should offer both challenge and success. Children, like adults, quickly grow tired of activities that are too easy or too hard. If the activity is long or involved, it should be divided into units which can be successfully accomplished along the way. Then if the child does not complete the whole activity, he will at least derive satisfaction from goals he has reached or mastered. (*See also Games; Play.*)

In leisure activities, children should seldom be set in direct competition with one another. The aim of leisure is self-improvement, not winning. A child may "win" by accident or luck, or he may win because his competitor is not a fair match for him. In either case, "victory" is hollow and can only give a false sense of superiority, not a rebirth of spirit.

The child who consistently "loses," loses more than the game. He may lose interest in the activity, the desire for social contacts, and his self-respect. The desire for approval which comes from success may lead him to find unfair ways to win. Either con-

A GOOD USE OF LEISURE TIME



These three high-school girls are using their after-school time to cut and sew new dresses for themselves. Sewing offers girls the opportunity to add to their wardrobe and to have the fun of saying, "I made it myself."

sistent winning or losing may harm the personality of the child. (*See also Child Development.*)

Instead of competing with one another, children should be encouraged to develop their skills in a program of self-competition. The Boy Scout, Girl Scout, and 4-H Club programs are built on this idea. The children win ranks, badges, and other forms of recognition based on levels of accomplishment. (*See also Boy Scouts; Camp Fire Girls; Girl Scouts; 4-H Clubs.*)

Children naturally seek the company of others their own age. This is wholly normal and should be encouraged. However, because a child has his own friends, he should not be denied his parents' companionship during their leisure hours. Sharing leisure experiences with the whole family is important to a child's growth. Parents should plan activities which include their children, even at the cost of giving up some (but not all) of their adult social functions.

These activities might include picnics, swimming parties, and outings where active fun is shared, or they might include learning experiences in which parents and children share. Children like to do things with an understanding family. It gives them emotional security and an all-important "sense of belonging." Parents benefit too. The company of their children and the wholesome results of such activities are rich rewards.

Leisure-Time Activities for Adults

During one's leisure time, a little aimless loafing does no harm; but most people find excessive idleness more tiring than work or strenuous play. The greatest benefits from leisure come from planned programs of activity. The activities should be difficult enough to provide a real physical or intellectual challenge, yet not so hard that accomplish-

ment is virtually impossible. A too-easy program leads to boredom; a too-difficult one exhausts strength and spirit instead of re-creating them.

The range of possible activities is wide. Many people choose to be active participants, others to be merely spectators. Some enjoy reading, sedentary games, or one of the collection hobbies, as stamps or coins. Others choose one or more of the arts—music, dancing, drawing and painting, or photography. Still others find recreation in doing useful, or constructive, tasks such as carpentry or sewing.

Whatever the choice, one rule applies: enjoyment grows with doing. To find real pleasure in an activity, one must have some skill, and skill comes only with honest practice. Acquiring a skill brings indirect satisfaction as well. For example, the people who most enjoy a professional baseball game are those who have played some form of baseball themselves. Once people have begun to paint as a hobby, they see new values in great paintings. Amateur musicians get keener delight out of concerts than those who have had no musical training at all. The man who does home carpentry has a good understanding of the work involved when he hires a skilled carpenter to do a major job.

People sometimes reach professional skill at a leisure-time activity, then turn this skill to profit. The pleasure of the activity then becomes complicated with the work elements. Time schedules, economic pressure, and risk—all present in nearly everything

that is done for gain—robs the activity of its recreational values. Fun becomes work, and new leisure activities must be found. (*See Work and Fatigue.*)

Competition for prestige or recognition also tends to rob activities of their recreational worth. A man's pleasure in his fine garden is heightened if he has produced it to beautify the whole area. His pleasure is less if he has worked only to outdo the man next door. A game must have its winners and losers, of course, but truly amateur players get their greatest satisfaction from sharing enjoyable experiences, no matter who wins.

Sharing experiences with family and friends is a vital part of any leisure program. Commercial amusements, where people sit and watch, have their place, but the best recreation is active participation. As one saying goes, "It's better to make your fun than to buy it."

Fun, pleasure, enjoyment—these may be derived from self-centered activities, or they may come as a result of service to others. The person with a sense of social responsibility allots some of his leisure time to serving his community and his nation. He works in his church, lodge, parent-teacher association, or any worth-while organization. He helps raise money for charity; he is active in service clubs such as Kiwanis or Rotary; he gives as much as he can of his time, money, and strength to many causes. He takes a serious interest in good government, keeping himself informed so that he can vote wisely. The quiet satisfactions that come from these interests are frequently more rewarding than the short-lived pleasures of essentially selfish activity.

Group Co-operation

Many community agencies are concerned with the wise use of leisure time. Education today is as much devoted to teaching young people to use leisure intelligently as it is to preparing them to earn a living. In many communities the school or the public library serves as a leisure activity center for both adults and children. A large share of the community's budget is spent on parks and playgrounds and to provide the band concerts, sports tournaments, and arts and crafts classes sponsored by these recreational centers.

Private organizations, such as churches, lodges, and veterans' groups, have their own constructive programs. They sponsor Scout troops, musical groups, and classes and clubs for the various arts and crafts. Such activities help the organization and its members. Families are brought together, new friendships formed, and experiences shared. All these strengthen the primary purpose of the organization. People who live in rural areas also have many organizations of their own which provide full recreational programs (*see Farm Life*).

Some Suggested Leisure-Time Activities

Reading should be a part of everyone's leisure program. A planned schedule of related reading will prove more rewarding than a random selection of books. If you like historical fiction, for example, try

ON THEIR WAY TO CATCH A "WHOPPER"



It's a real holiday when father and son can go off together for a day's fishing. Angling is a favorite sport for all ages, and the change it provides brings rich returns in health and energy.

reading factual histories of the same period. Increase your reading speed, and you will find that both enjoyment and comprehension will be increased. (*See also Reading.*)

Collection hobbies need not be expensive. For example, you can begin a collection of United States commemorative stamps by buying them at face value from the post office as they are issued (*see Stamp and Stamp Collecting*). Many people have gathered interesting coin collections merely from the coins they have received in change. Sea shells, butterflies, and leaves or flowers make beautiful, informative, and worth-while collections. (*See also Nature Study.*)

People who do "mental" or other sedentary work often find relaxation in handicraft. A work bench and a wide range of tools are not always needed. Using the end of a fruit crate for wood and a jackknife for a tool, you can make interesting low-relief carvings. Even in small living quarters you can find space to do such work as tooling leather or painting. (*See also Arts, The.*)

Parents and children can do many things together. They can grow flowers or vegetables, raise pets, or develop one of the many nature collections. They can share many kinds of reading matter. Even such pastimes as "Twenty Questions" and various word-building games are both fun and intellectually stimulating when the whole family joins in.

Among commercial amusements, such as movies and professional sports contests, there is a wide choice. These should not occupy the whole of one's leisure time, nor should the passive forms of home entertainment, as radio and television. Read the reviews carefully and choose the shows or programs that are of genuine interest to you. As with any form of recreation, wise planning beforehand is needed to derive real pleasure. (*See also Hobbies; Vacation Activities.*)

The Spending of Time and Money

How do people actually spend their leisure time? Surveys show that the ten activities most frequently engaged in are newspaper and magazine reading, listening to radio and watching television, attending movies, visiting or entertaining visitors, reading fiction, automobile riding for pleasure, swimming, writing letters, reading nonfiction, and conversing. The home still occupies an important place as a recreational center, and it increases in importance as people grow older.

Every year the American people spend about one ninth of their total income on leisure-time activities. In other words, they spend nearly six weeks' income out of 52 on play, amusements, and other leisure-time pursuits. About 8 per cent of the total area of a suburban district such as Westchester County, N. Y., is given over to recreational purposes. National parks and monuments cover an area larger than the state of Maine and are visited by millions of people yearly. State parks and monuments also draw huge crowds of visitors. A quarter of the nation's huge ex-

penditure on automobiles—their purchase, operation, and maintenance—is directly chargeable to recreation.

These facts and figures show that leisure activity involves substantial personal and governmental expenditures. People sometimes need to be cautioned against spending money foolishly; more often they should be warned against foolish and wasteful expenditures of time. If leisure-time activities are to yield full returns, they must represent wise investments of both time and money. Only then can recreation become true "re-creation."

Books about Leisure

Good books on leisure are: 'The Challenge of Leisure', by A. N. Pack (Macmillan, 1934); 'How to Retire—and Enjoy It', by Ray Giles (Whittlesey, 1949); 'Leisure and Recreation', by M. H. and E. S. Neumeyer (Barnes, 1949); and 'Road to a Richer Life', by W. B. Pitkin (Prentice-Hall, 1949).

LEMON. As the mercury rises, the demand for lemons increases by leaps and bounds. In the long hot days of summer nothing seems more refreshing than a glass of sparkling lemonade, with ice tinkling in its cooling depths.

In Italy, Sicily, Corsica, and other parts of southern Europe, particularly in Spain and Portugal, lemon culture has been a large commercial industry for many years. European markets still look to these districts for their lemons.

Until the cold wave of 1894-95 the lemon industry in Florida was of considerable importance. Since that time the great development of lemon culture in the United States has been in the irrigated lands of southern and central California. Today California grows nearly all the American crop and about half the world crop of lemons. It ships fresh lemons, bottled lemon juice, and concentrated lemon juice that is canned and frozen.

The lemon is a close relative of the orange and has followed it to many countries. The straggling branches of the lemon tree, however, are unlike the compact dense foliage of the orange tree, and the purplish flowers do not have the agreeable fragrance of the white orange blossoms. The lemon is much less hardy than the orange and thus the area of its cultivation is more restricted. It is cultivated and propagated in much the same manner as is the orange (*see Orange*). A tree bears as many as 3,000 lemons a year.

If lemons ripen on the tree they lose their keeping quality, and so they are picked green before there is any sign of the golden yellow coloring. Each picker has a little ring $2\frac{1}{4}$ inches in diameter, and the fruit is cut when it can just slip through the ring. From this moment the lemons must be handled very carefully. In dark storehouses, well ventilated but free of drafts, they are carefully spread out and slowly ripened. In curing, the fruit shrinks a little; the skin becomes thinner and tougher and develops a silky finish. When the process is completed the lemons are washed, dried, and sometimes wrapped in tissue paper. In this condition they will keep for

months, which is a very good thing for the growers, as most of the fruit ripens in the winter and the great market demand is in the summer.

The lemon is used in more different ways than any other of the citrus fruits. From the rind, lemon oil or extract, used in flavoring and perfumery-making, is obtained either by pressure or distillation. The rind can be cooked with sugar to make candied lemon peel. The pulp yields lemon juice, which contains citric acid and citrate of lime and is an excellent source of Vitamin C. The juice is used in flavoring foods and drinks, and it may be used as a bleach in the printing of some cotton fabrics.

Scientific name, *Citrus limonia*. Fruit probably introduced into Europe from Asia about the same time as the sweet orange. The tree flowers continuously and the trees contain flowers and fruits in all stages of development most of the year. Like the apple and orange, it varies exceedingly under cultivation. The lemon tree is exceedingly fruitful, some of the large old trees of Spain and Sicily ripening as many as 3,000 fruits in a favorable year.

LEMURS. Small monkey-like animals, the size of cats and squirrels, with big eyes, foxlike faces, and doglike nostrils—such are the lemurs. The name comes from the Latin *lemures*, meaning “ghosts,” and is given them because of their nocturnal habits, their shy silent ghostlike movements, and their love of forests and darkness.

Lemurs are the lowest of the primates, the group which also includes monkeys, apes, and man. Most of them have tails, but they cannot hang from trees by them as some monkeys can.

With their numerous relatives, lemurs form the family called *lemuroids*. Of the 90 or so species of lemuroids, 50 or more are in Madagascar. All are restricted to the southern regions of the Old World—Africa, India, Ceylon, the Philippines, etc.—but only in the islands of Madagascar and Comoros are the true lemurs found. Interesting forms with local names include the beautiful but noisy ring-tailed lemur, whose bushy tail is marked with alternate rings of black and white; the large *indri* or *babakoto* (“little old man”) of Madagascar; the dark iron-gray *gentle lemurs* which frequent the bamboo jungles; and the “aye-aye” of Madagascar, so named from its cry. Fossil remains of lemuroids are found in many lands, including North America. Lemuroids in general eat leaves, fruits, insects, small reptiles, birds, and birds’ eggs. (See Monkey.)

LENIN, NIKOLAI (1870-1924). When the Red Terror of the Bolsheviks was raging in Russia in 1917-18, a short stockily built man, bald-headed, with steel-gray eyes peering beneath the broad brow of a scholar, sat within the Kremlin at Moscow directing the activities of the Soviet government, of which he was the head. It was Lenin, whose real name was Vladimir Ilich Ulyanov. Although the son of a councilor of state, he had been a revolutionist since his youth. When he was 17 years old his brother was hanged for plotting to kill the czar, and when he was 26 he himself fell into the hands of the imperial government and was exiled to Siberia. Following the

expiration of this sentence, being forbidden to reside in any of the large cities of Russia, he lived in Munich, Brussels, Paris, London, and Geneva. He became widely known through his authorship of several scholarly but radical works on economic topics. After 1903 he was the recognized leader of the wing of Russian socialists who called themselves Bolsheviks.

When the government of the czar was overthrown in 1917, he returned to Russia, and replaced the mild socialist government of Kerensky with one of extreme radicalism. His enemies accused him of accepting German aid and money. Indeed, to serve its own ends, the German staff had given Lenin and a few other Russian radicals their homeward passage in a closely guarded train from the Swiss frontier across Germany. Yet there is no proof that Lenin took German money to disorganize the Russian army. Lenin favored immediate peace with Germany, to prepare the way for a world revolution directed against all capitalist and imperialist governments. Nothing else mattered. He called upon the working class to rise up and seize control of the land and industries, and establish the “dictatorship of the proletariat.” The result was the Russian Soviet Republic, with himself as premier and Trotsky as minister of foreign affairs and war.

Possessed of one idea to the point of fanaticism, Lenin throughout his life showed himself a man of relentless determination and iron courage. Wounded by an assassin’s bullet in August 1918, he recovered quickly. At the height of his power he continued the simple life of his long years in exile. Lenin, the scholar who spoke three languages and read three more, provided the brains of the Soviet experiment, as Trotsky furnished the fiery spirit and the genius for military organization. Lenin’s driving energy finally wrecked even his strong constitution, and he died Jan. 21, 1924, at Gorki, near Moscow, after a long siege of paralysis. His imposing granite tomb in Moscow became an objective for pilgrims from all over Russia. His khaki-clad body, preserved by skillful embalming, can be seen in its glass casket.

LENINGRAD. When Peter the Great founded this city as the capital of Russia in 1703, he called it “St. Petersburg,” after his patron saint. But the Russians disliked this Germanic name and during the first World War changed it to “Petrograd,” *grad* being a form of *gorod*, the Russian word for “town.” In 1924 the Soviet government changed it again to “Leningrad,” in honor of Lenin, leader of the Revolution.

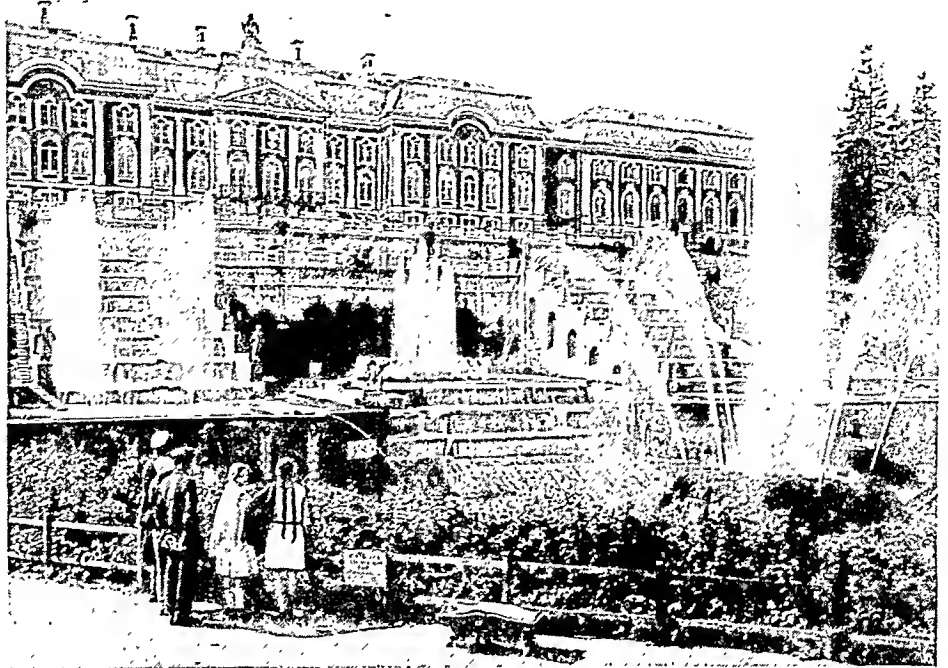
The site of the city, at the mouth of the Neva on the Gulf of Finland, has been important as an outlet for trade since ancient times. The country, however, was only a desolate marsh, dangerously exposed to floods and storms, and the idea of building a city there seemed preposterous. But Peter the Great was determined. “I want a window to look out upon Europe,” he said. And so, in 1702, at his command, the “window” started to take shape. Human life meant little to the Russians, and thousands of peasants were brought there who died of disease and hardship

as they sank the forest of piles for the city's foundation. So many perished that the city is said to be "built upon bones."

Peter had traveled in western Europe, and wanted his capital to be magnificent. The major portion was to stand on a peninsula where the Neva arched to the northward, then turned southwest to the Gulf of Finland. On the left, or southeast, bank of this last portion rose the Old Admiralty in a magnificent square. Adjoining this square stood the Winter Palace, while across the river on an island rose the grim fortress of St. Peter and St. Paul. The principal streets radiated from this center, and included the Nevsky Prospekt, meaning "view of the Neva." This

street, one of the most magnificent in the world, ran roughly southeast to join the road to Moscow. The islands in the river were linked by bridges, and canals helped drain the site. Palaces were lavish, and a court life, the most brilliant in Europe, grew up, amid unbelievable extravagance. In Peter's day the harbor was at Kronstadt on the island of Kotlin, some 20

WHERE PETERHOF'S BRIGHT FOUNTAINS DANCE



In 1720 Peter the Great built this grand palace set in vast formal gardens in the little town of Peterhof (now Petrodvorets) on the Gulf of Finland, southwest of Leningrad. The famous fountains, damaged during World War II, were restored in 1953.

miles to the west; but a channel cut through to deep water in 1885 let ships reach the city.

But there was also an abject poverty which contrasted strikingly with the brilliance of the court. The atmosphere of the city was tense with repression, fear, contempt, and hate; unrest grew rapidly. There was a strike of textile workers in 1749; the Dekabrist mutiny took place in 1825; and sporadic uprisings occurred during the next century. There was revolution in 1905, and in 1917 came the two revolutions which finally established the present Soviet state.

The glamorous palaces and the fine houses of the aristocrats have now been converted to other uses. Some are museums—museums of the bygone imperialism. Some are hospitals, schools, day nurseries, or club rooms. The colossal Winter Palace—the largest palace in Europe—has become the Palace of Art and Museum of the Revolution. This mammoth building, which was begun in 1754 and completed ten years later, was the residence of the czars. It housed 6,000 people. Connected with it is the Hermitage Fine Arts Gallery, which still boasts one of the richest art collections in the world. Not far

LENINGRAD'S MOST FAMOUS STREET



This is the Nevsky Prospekt of czarist days, now called the Prospekt of the 25th of October in honor of the Bolshevik capture of the Winter Palace on that date in 1917. The street is noted chiefly for its great width, about 130 feet. Few of the houses are impressive. Many such bridges cross the Neva, its branches, and its canals in Leningrad.

WHEN SOVIET RUSSIA GOES SHOPPING



Here is a government supply station with its usual line of patient customers waiting their turns to buy. Many of the fine shops, which before the Revolution rivaled those of Paris in their displays of luxury goods, have been converted into these government depots selling now the plainest of necessities.

away is the Court Stables Museum, with one of the rarest displays of court carriages in existence. There are also the Russian Museum, with its vast records of Russian history, culture, and religion; the Central Naval Museum, housed in the famous Admiralty; the Agricultural Museum; the Children's Welfare Museum; the Tolstoy Museum; Pushkin Museum; and museums of People's Health, Commercial Navigation, Musical Instruments, Home Industry, Applied Arts, and Comparative Religious Thought. The list of museums is almost endless. The people take a remarkable interest in them, and every day groups of children study the collections.

The city was formerly the educational center of all Russia. Large numbers of foreign students came, too. Even after the trying years of the Revolution, it retained much of its reputation for scholarly achievement. The Academy of Sciences and the State Public Library are world famous. Among the many institutions of higher learning are the Leningrad State University, the Communist University for National Minorities, the Polytechnical Institute, and the Academy of Fine Arts.

After 1917, Leningrad languished. Revolution and counter-revolution, the threat of invasion by foreign armies, floods and famine, and the removal of the capital to Moscow in 1918, left the city drab, cheerless, deserted. The population decreased from more than 2,400,000 in 1916 to less than 725,000 in 1920. Fashionable shops were boarded up. Row after row of empty houses stared through broken windows to empty streets. Its grandeur was gone, and only desolation and poverty remained.

Not until about 1930 did the Soviet government revive the city. Then it replaced slums with modern apartments, parks, and schools, and built factories, machine shops, grain elevators, and shipyards. Leningrad again became a center of industry and resumed its place as a key port and naval base. The city now ranks second only to Moscow. Population (1947 est.), 3,300,000.

The city's new strength entered the people themselves. In the second World War their heroism defeated an entire German army. For more than two years the men, women, and children of Leningrad withstood a siege by the Nazis. Half the time the city was cut off from the rest of Russia. Tons of shells shattered homes and factories. Starvation and cold killed thousands. But the people of Leningrad stood firm until freed by the Red Army in 1944.

The climate is cold and damp and subject to sudden changes. Rain and snow fall nearly half the days of the year and the Neva is frozen over from November to April. Destructive floods are frequent in the spring. The average temperature is 38.6° F. Summer weather lasts only six weeks.

LENS. For thousands of years, men could study only what they could see with unaided eyes. They saw the planets and stars as shining points and could see nothing more. They knew nothing of the cells and fine tissues in their bodies. And they never guessed that billions of tiny microbes and disease germs infest the earth, the air, and all living creatures.

Then a few hundred years ago, men found that certain pieces of curved glass seemed to work like magic in helping them see. Old people could read small printing and writing by candlelight. Church steeples in other towns seemed to be standing in the next block. Astronomers could see moons circling around the planets. Tiny plants and animals could be seen in a water drop. Men called this magic-working piece of glass a *lens*, because it was shaped like a lentil. (The Latin word *lens* means "lentil.")

Today we use lenses in countless ways. Millions of people use them in spectacles. In telescopes they help us study faraway stars and planets. In microscopes they show us disease germs. We use them in cameras and motion picture projectors.

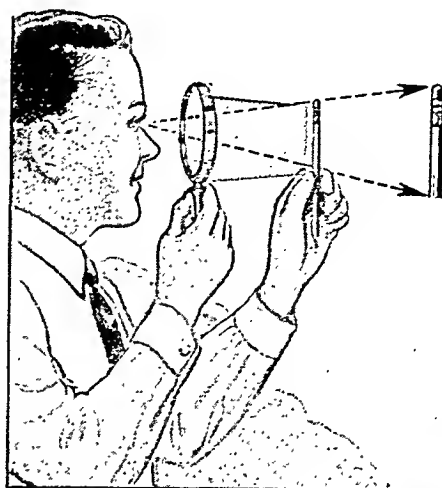
What Is a Lens?

You can see what a lens is by comparing a window pane with eyeglasses. Both are made of glass. But you look through a window pane and see everything on the other side just as it is. Now look through the eye-

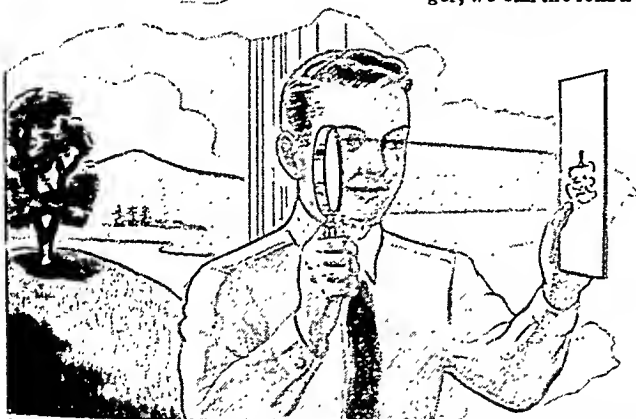
Things You Can Do with a Magnifying Glass



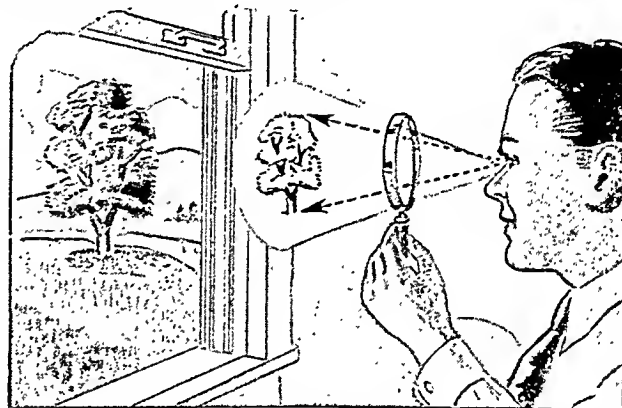
The experiment at the left shows how the sun can make fire as well as light. Hold a magnifying glass so the sun's rays make a tiny round spot on a sheet of paper. Soon you see the paper begin to scorch and give off smoke. You have made fire by focusing all the heat rays that struck the lens onto one spot. You have used your lens as a burning glass.



Hold a clothespin or a pencil in one hand and a magnifying glass in the other. Bring the glass and the object close to your eye. You see the object as though it were quite far from the glass and larger than it actually is. Because it makes objects appear larger, we call the lens a magnifying glass.



Hold your magnifying glass so that light coming through the window falls on it. Bring a sheet of paper close to the lens. On the paper, you see a tiny upside-down image of the window and the objects outside it. In this experiment we see how a magnifying glass makes miniature, upside-down images, as well as large ones.

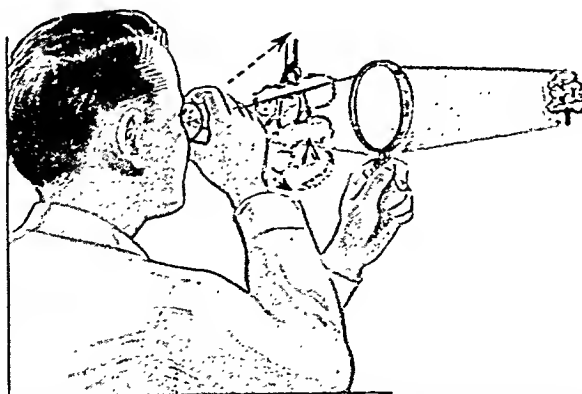


If you hold the lens between you and the window and bring your eye very close to the lens, you see another kind of image. It is right side up and smaller than the object. It seems about as near as the lens. But it is not sharply focused nor easy to see. A better way to see distant objects is shown in the picture below.

glasses. Most of them make everything seem larger and nearer. Now notice that the glass in the window pane is flat, while it is curved in the eyeglasses. The curve is what makes each eyeglass a lens.

Light Waves and Rays

To understand why curvature makes a lens, we must know how light travels. When light leaves the sun, a lamp, or other source, it goes out in waves, like the ever-



This time, hold one lens at arm's length and another near your eye. Between the two lenses, you see an enlarged, upside-down image. You have imitated a simple telescope.

widening ripples in a pool. Often, however, it is convenient to think of light as traveling along straight lines called *rays* (see Light). A drawing on the next page shows the relation between the two ways of thinking. The rays run out across the widening waves like spokes in a wheel. At every point they show the

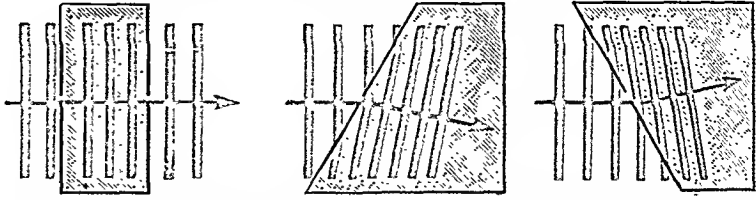
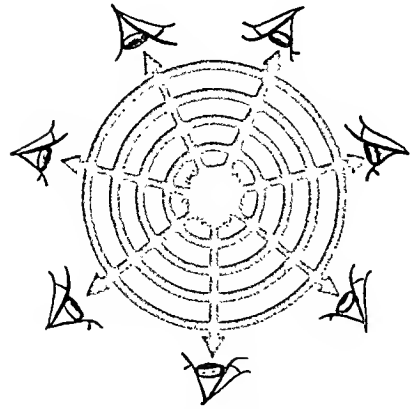
direction in which the wave is moving. Each view reflects certain facts about the true nature of light, and each is helpful in showing how lenses work. The drawings on the following pages use both waves and rays to explain how lenses act to form images.

Speed of Light in Air and Glass

Next we must know how light passes through a lens. Only a few substances, such as glass, let light pass through clearly. We call these substances *transparent*. As far as our eyes can

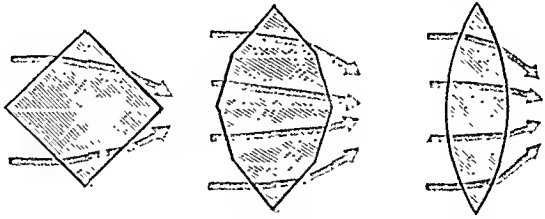
tell, the light gets through instantly. Actually it does not. We just think so because light travels at enormous speed. In a vacuum it covers about 186,000 miles a second. In air, it goes almost as fast. But in heavier (denser) transparent substances like glass, it does not travel as fast. Water slows its speed to

How Glass Affects Light Waves and Rays



At the left we see light waves traveling out from a source. Across the waves are lines running outward like the spokes of a wheel. We can think of each line as the path taken by a particle when an ever-widening circle carries it outward from the source. We call these lines *rays* of light. The pictures above show what happens to light waves when they pass from air to glass. In the first one, we see how the waves slow down while they go through a window glass. Then the waves go straight on after they are through. In the others, they strike a slanting surface such as a prism. Different positions of each wave are slowed down as they strike. Thus the waves are bent (refracted), as explained in the article.

about 139,000 miles a second, and ordinary glass to about 124,000 miles. This slowdown when light passes from air to glass (and speed-up when it passes from glass to air) is what makes a lens work. We get an idea of the way these changes in speed occur by looking at the accompanying pictures of light waves and rays passing through air and glass panes and prisms.



At the far left, two glass prisms put together bend light rays. In the center, sections of several prisms are put together and each one bends a ray. In the third picture the prisms have been joined and the edges have been rounded. We now have a *convex lens*. It bends light rays the same way prisms do.

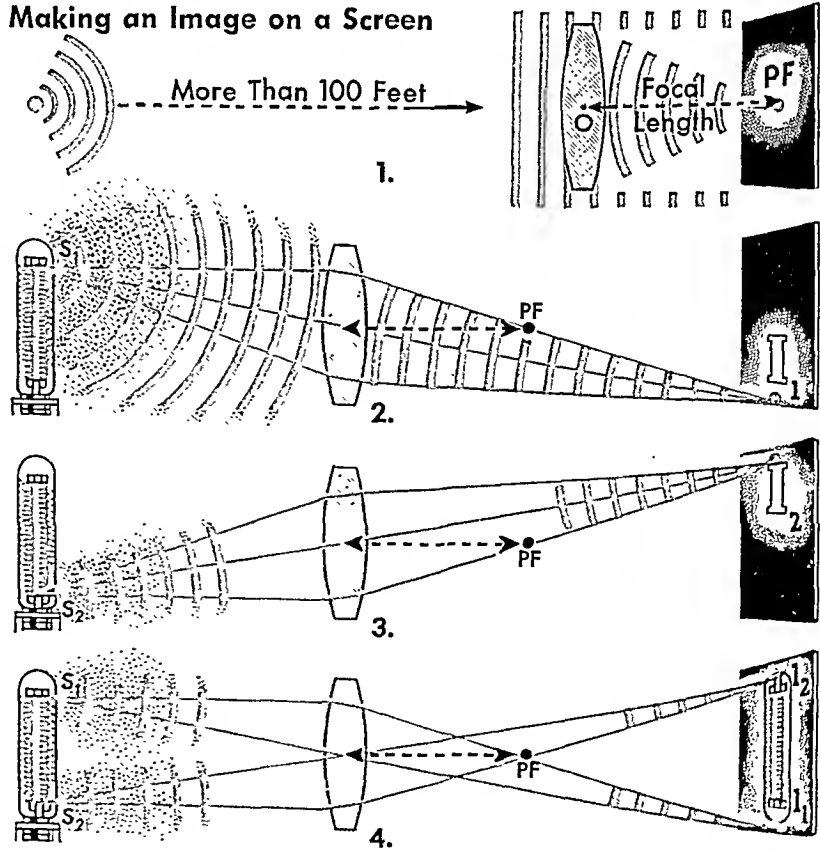
wave hits first, the action is reversed. The result may be compared to that of a man hitting his head in a doorway. His head stops, and his feet go forward and out from under him. A light wave is "tripped upward" in somewhat the same way. In the picture at the

How a Prism Bends (Refracts) Waves and Rays

The action of a prism can be compared to a person running through a doorway and hitting the bottom or the top. When the lower part of a light wave strikes a slanting glass surface, the glass slows it down. The action is like a person tripping on a doorsill. His feet stop, but his head goes forward and down. One of the pictures shows a wave tripped in this way. As the curvature of the wave is changed, the ray which shows its line of motion is also changed. The ray is bent downward.

This tripping of waves (or bending of rays) is called *refraction* of light. If the *top* of the

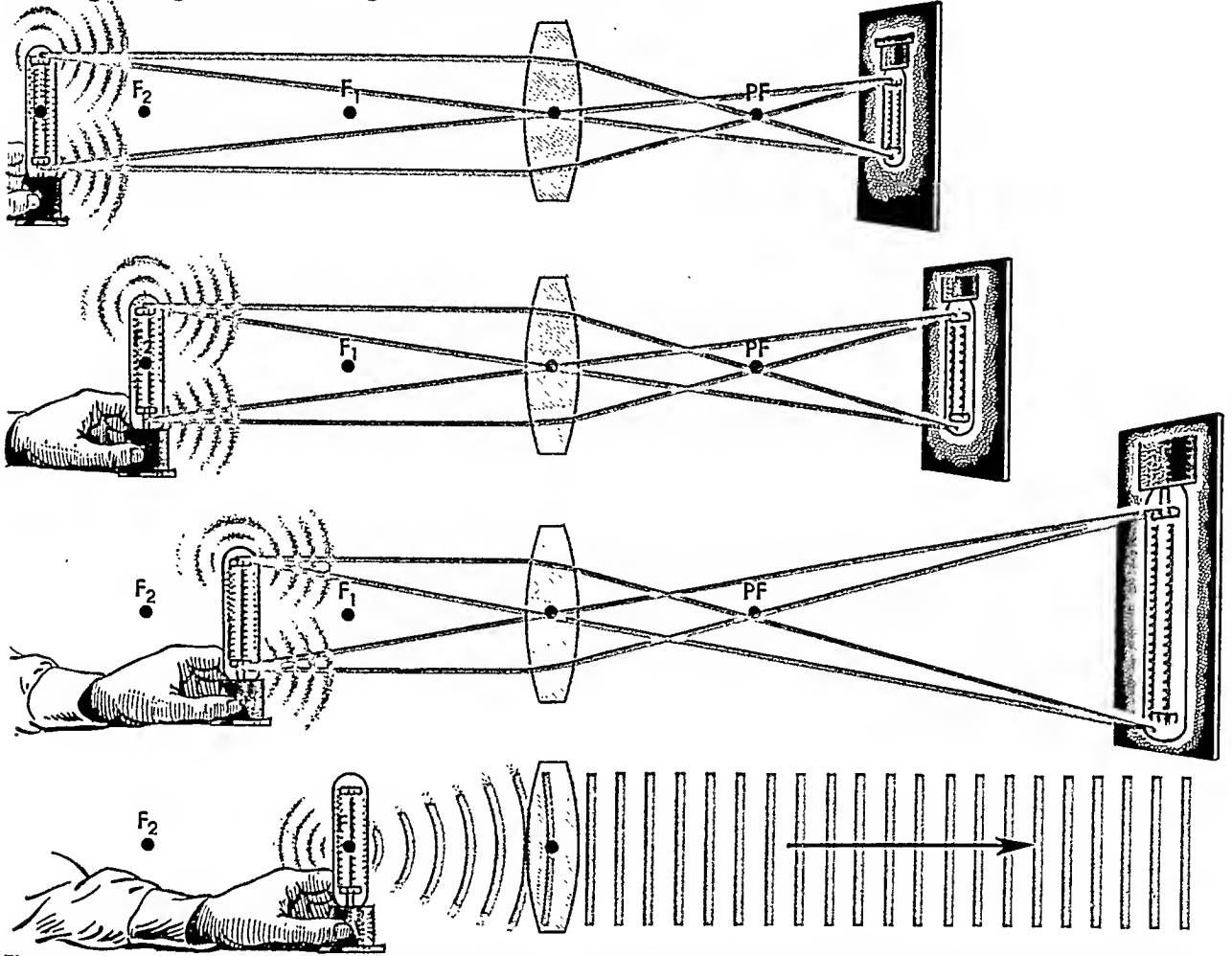
Making an Image on a Screen



These diagrams show how a lens changes light waves (or bends rays) to form an image on a screen.

1. Waves from a distant source are so wide that any small section looks flat or *plane*. These plane waves emerge from the lens in ever-shrinking circles that come to a point (PF) called the *principal focus* of the lens. The distance from O to PF is called the *focal length*.
2. Here waves from a near-by point S_1 on a light bulb are still strongly curved when they strike the lens. The lens slows down the center parts of each wave and brings the waves to a focus at a point I_1 on the screen beyond the principal focus of the lens.
3. Waves from a point S_2 on the bulb are brought to a point I_2 on the screen.
4. Here images of S_1 and S_2 are formed as before. Images of intermediate points on the bulb are made between I_1 and I_2 . The result is an upside-down (inverted) image of the bulb on the screen.

Making Images with a Light Bulb and a Screen



The size of image made by a lens depends upon how far the object is from the lens. To see why, measure two focal lengths from the lens. Then start experimenting. Place a light source more than two focal lengths from the lens. Adjust a screen to get a clear image. The screen will be between one and two focal lengths from the lens. The image will be upside down and smaller than the source. Set the source two focal lengths from the lens. The image will be two focal lengths behind the lens. It will be upside

down and the same size as the source. Put the source between one and two focal lengths from the lens. The image will be more than two focal lengths behind the lens and larger than the source. If a point source is one focal length from the lens, the light will leave the lens as a beam of plane waves. It will not form an image. You have reversed the first experiment on the preceding page. Your lens has bent convex waves from the lamp into plane waves. You have provided a broad beam of light for a projector.

top of the page, the ray is also bent upward to show the change in the direction of motion.

The laws of refraction are explained more fully later in this article and in the article on Light. But the plain fact of "tripping" (bending or refraction) will explain common lens action if we remember a few more points.

So far we have explained refraction by a prism. But a lens acts like parts of thin prisms put together, with the outer surfaces ground into smooth curves. At any part of either curve, light is refracted just as it would be by the face of a prism.

We can trace the bending accurately by using a line called a *normal*, as shown in the diagram to the right. Imagine a line drawn perpendicular to the glass where the ray strikes. This line is a normal. Now notice the angle (I) between the entering ray of

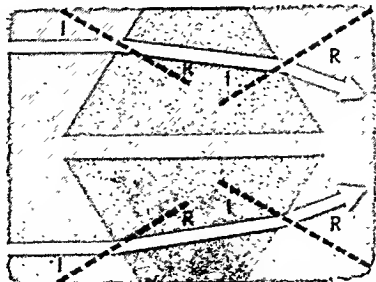
light and the normal. It is called the angle of incidence. Next notice the angle (R) between the ray and the normal after the ray has entered the glass. This is called the angle of refraction. You see at once that it is less than the angle of incidence. The ray has bent *toward* the normal. This always happens when light passes from a lighter medium, such as air, into a denser one such as glass.

A reverse bending occurs when light passes from glass into air—that is, from a denser medium into a lighter one. Now the ray bends *away* from the normal. The angle of refraction is greater than the angle of incidence.

Focal Length

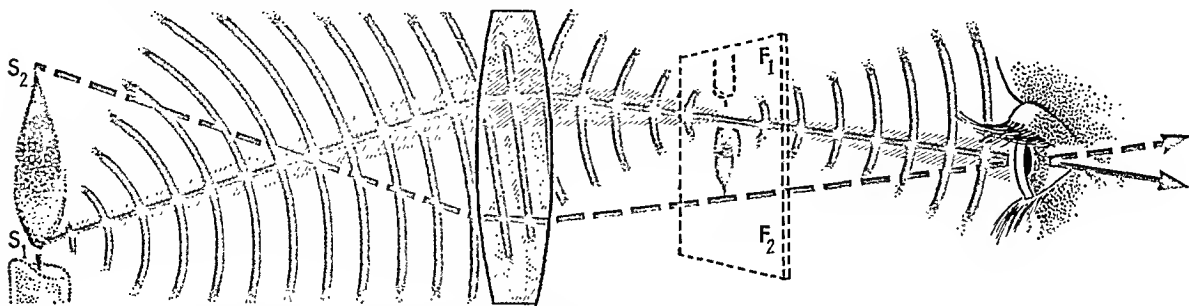
A final important feature of the lens is its *focal length*. This is the distance at which the lens will bring plane waves to a focus. Anyone can measure it roughly for a convex

THE HANDY "NORMAL"



The dotted lines above are drawn perpendicular to the glass surfaces at the points where light rays strike. Such lines are called *normals*. The article tells us how a normal is used to trace refraction of a light ray (bent arrow) by a prism or a lens.

How the Eye Sees through a Convex Lens



Here we trace light from the ends of a candle flame. When waves from S_1 (bottom of the flame) strike the lens, the centers are slowed down. The waves leave the lens in concave form to focus at F_1 . We can trace their course by the solid ray. The broken ray shows light from S_2 focusing at F_2 . A screen at this location would show an inverted image. Because the image can be shown here, it is called *real*. If no screen is present at the

focus, waves still radiate from F_1 and F_2 as new sources. When waves from each point enter the pupil of the eye, they are focused on the retina. Thus the eye "sees" the flame as though it were on the screen. (An orange tint indicates the light which enters the pupil of the eye from F_1 .) Actually, the inverted image that we see on the screen is brought erect in the eye. The brain corrects the change and we see the image inverted.

lens by using it as a burning glass. The spot where the lens focuses the light is the principal focus. The distance from this spot to the center of the lens is the focal length (often written as F). The length is fixed by the bending (refractive) power of the lens. The focal length shortens as the power increases.

Focal length can be stated in units of length, such as inches, centimeters, or millimeters. It is customary in photography and astronomy to give also the *relative aperture* or "f-rating" of the lens.

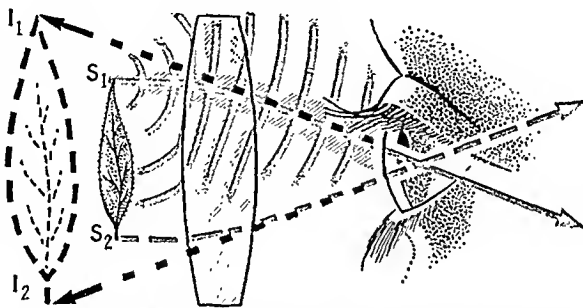
This number is the focal length divided by the greatest diameter of the lens available for focusing light rays. Thus a lens with a focal length of 8 inches and an effective diameter of 2 inches is rated at $f/4$.

Cameras and some telescopes have a device for regulating the actual aperture to be used. This is a diaphragm, which opens and closes like the iris of the eye. The various openings are marked with f-numbers. Low numbers mark large openings and high numbers small openings. They are arranged so that the exposure needed varies about as the square of the f-number. (See also Photography.)

Kinds of Images

The pictures in this article show many kinds of images being formed by lenses. Some are right

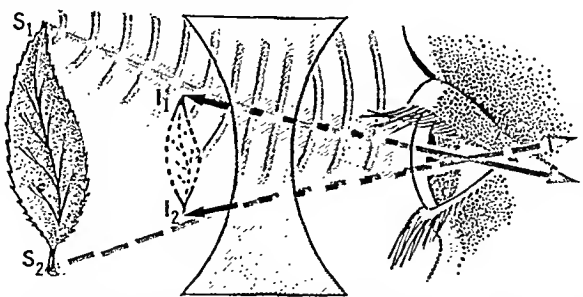
Action of a Magnifying Glass



The lens is powerless to form an image if the object is less than one focal length away. It cannot bend the light waves from any point, such as S_1 on the leaf, sufficiently to focus them. But the convex lenses of the eye complete the focus at a point on the retina. Thereupon the eye sees the point on the line of the incoming ray at I_1 . We can trace the action on the band of light (orange tint) which enters from point S_1 . Similarly the eye sees point S_2 of the leaf at I_2 . Thus the image is enlarged. It is also virtual. It cannot be shown on a screen. It can only be seen by an eye.

when the light comes from a great distance and the waves are plane (flat) when they strike the lens. If they still have curvature, the lenses will not focus all the light at one point. Waves from different points on the object will strike the lens at slightly different angles. The lens in turn bends or refracts the waves

How a Concave Lens Reduces



Here a concave lens acts as a reducing glass. Waves from point S_1 on the leaf are bent as shown (tint and solid ray) and enter the eye. The eye "looks back" along the ray, as indicated by the broken black line, and sees point S_1 at I_1 , the apparent center of curvature for the waves. Similarly it sees S_2 at I_2 . The image is virtual, erect, and smaller than the object.

side up and some are upside down (inverted). Some are larger than the object and some are smaller (reduced). Why these differences occur can be seen in the diagrams. Another difference, which must be considered more carefully, is the distinction between real and virtual images.

The distinction turns upon the way a lens focuses light to form an image. We have seen how a burning glass focuses all the light that strikes the lens upon a single point. But this happens only

when the light comes from a great distance and the waves are plane (flat) when they strike the lens. If they still have curvature, the lenses will not focus all the light at one point. Waves from different points on the object will strike the lens at slightly different angles. The lens in turn bends or refracts the waves according to these differences. If it bends them enough to focus them, the waves from each point of the object will be focused at a different point on a plane, called the *focal plane*. The plane is perpendicular to the line for the focal length. A screen placed in the focal plane will show the image. A photographic film set in this plane will also register the image. Therefore, the image actually exists and we call it *real*.

In order to focus waves, however, a lens must change oncoming convex waves to concave ones, so they will converge upon a point. Otherwise the lens cannot produce a real image. A concave lens never can do so, because it always makes oncoming waves more convex. As a result, rays going through the waves *diverge*.

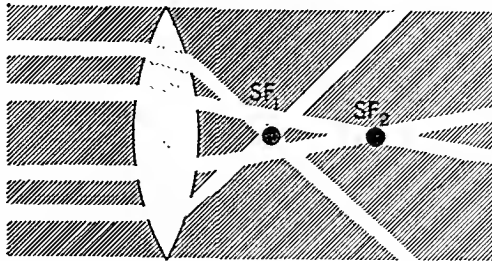
In some cases, the lenses of the eye gather in the diverging rays as they leave the lens and bring them to a focus on the retina. So every point of the object is registered clearly. We *think* we see the image between the lens and the object. But it is impossible for light rays to be focused there. Our eyes have fooled us. So we call this false image a *virtual* image. A concave lens will always form a virtual image that is smaller than the object. Hence it is called a *reducing* glass. A simple magnifying glass forms enlarged virtual images. All these distinctions can be traced in the various diagrams of lens action in this article.

Remedying Aberrations of Lenses

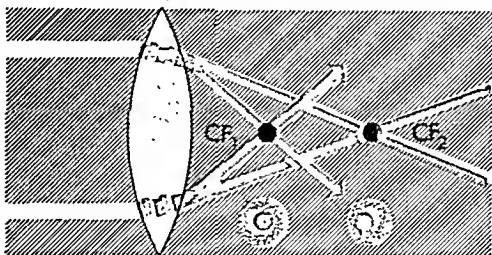
Simple lenses are subject to certain defects of action called aberrations. One defect, *spherical* aberration, arises near the edge of the lens. There, light meets the lens at sharply increased angles. This increases refraction and focuses light nearer the lens than light that passes through more central parts. This defect can be remedied by altering the usual spherical curvature of the lens surface or by combining properly designed convex and concave lenses into an *aplanatic doublet*.

Another defect, *chromatic* aberration, consists of separating white light into colors. In the articles on Color and Light, we learn that light of a certain wave length looks red. A shorter wave length makes us see yellow, and so down to blue and violet. White or colorless light contains all wave lengths. When white light strikes a simple lens made of glass, the glass does not refract each wave length (or color)

Spherical Aberration



Chromatic Aberration



Light rays that strike near the edges of a simple lens are refracted differently than those that strike near the center. The outer rays are focused closer to the lens. This difference is called *spherical aberration*. Ordinary lenses also act differently on each of the colors that make up white light. The blue rays focus closer to the lens, the yellow ones farther away. At each focus, we get a spot of the focused color and a halo of the others. This difference in focusing by color is called *chromatic aberration*.

equally. The lens brings the shorter blue waves to a focus in less distance than it does red. Other colors are focused between these extremes. As a result, the colors are blurred, as shown in the diagram.

For many years color dispersion hampered optical instruments greatly. Then in 1733, an English attorney, Chester Moor Hall, found that flint glass disperses light into a longer spectrum than crown glass. He cut a convex lens of crown glass and combined it with a concave lens of flint glass. The concave lens canceled out the color fringe around the images. This was the first *achromatic* lens. John Dollond, an English optician, is often credited with the discovery because he made the new lens generally available.

Manufacturing Lenses

The making of a lens is a delicate and highly specialized task.

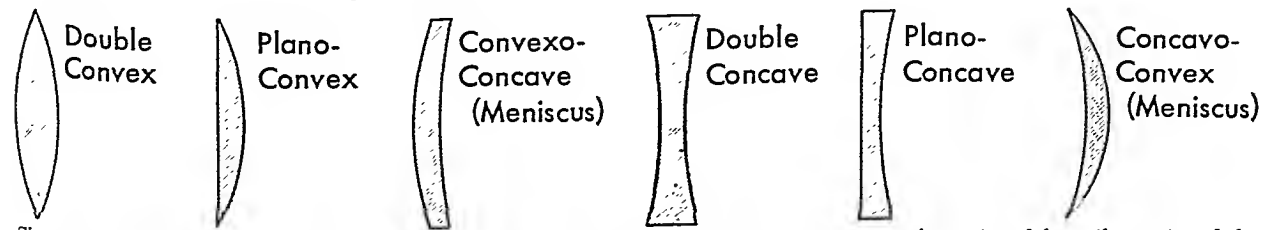
The glass used in the lens must be of the highest quality and the workmanship must be perfect. The huge lenses of telescopes are specially made. But lenses for eyeglasses are usually made in large lots.

As it comes from the furnace, optical glass is in rough broken chunks. These are tested for imperfections and out of perfect pieces workmen form lens blanks. They heat the glass until it is plastic and then mold it into disks about the size of a lens.

Lenses are ground from these blanks in a series of operations. "Roughing" comes first. For this an iron dish coated inside with carborundum is revolved against the blank. This gives the general shape to the lens. Then the lens maker grinds it to final form in many stages. At each stage he uses a tool that is closer to the final form than the last. As the grinding goes on, he uses finer abrasives. For the last cut he uses an emery-coated tool of exact form.

Finer emery is used to smoothe the lens. Next it is given a final polish with a fine ferrous oxide, called *rouge*. The lens is now cut or *edged* to the proper

Shapes of Common Simple Lenses



Simple lenses are named for the shapes of their surfaces. Either surface can be convex (curving outward from the center of the lens), concave, or flat (plane). The name of the lens combines the appropriate name for each surface, as shown above.

diameter on a lathe. After final inspection for flaws, the lens is ready for use.

Optical Computations of Lens Action

For exact study of lenses, the science of optics uses many definitions and rules. One definition enables us to measure and compute refraction.

As we know, light travels at less speed in water than in air, and it goes even more slowly in glass. Opticians state these speeds in usable form as follows: the ratio of the speed in air to that in any other medium is the *refractive index* (or *index of refraction*) of the substance. Since light travels only $\frac{3}{4}$ as fast in water as in air, the index is $\frac{4}{3}$ or 1.333. For window glass it is about $\frac{3}{2}$ or 1.5.

The index can be found for any substance by comparing the angle of incidence with the angle of refraction. The ratio between the *sines* of the two angles is the index. (For the meaning of "sine," see Trigonometry.) For example, suppose a light beam passes into a medium at an angle of 30° from the normal and is refracted to 22° . The sine of 30° is .5, and for 22° it is .375. Dividing .5 by .375 gives 1.333, the index of refraction. Likewise the angle of a refracted beam can be calculated from the incident angle and the index of refraction.

The shape of a lens can be defined by locating the center of curvature for each face. The curves and the refractive index determine where the principal focus will be and fix the focal length. The central point of a lens is called the *optical center*. Rays which pass through the optical center are refracted. But they emerge parallel to the incident ray.

These formulas tell the location of images:

$$\frac{1}{D_i} = \frac{1}{F} - \frac{1}{D_o} \quad (1) \qquad \frac{1}{F} = \frac{1}{D_o} + \frac{1}{D_i} \quad (2)$$

In these formulas, F is the focal length, D_o is the distance from the optical center to the object or source, and D_i is the distance to the image. For an example, suppose an object is two feet from a lens which has a focal length of one foot. Then

$$\frac{1}{D_i} = \frac{1}{1} - \frac{1}{2} = \frac{1}{2}.$$

The image will be two feet from the lens. If a figure for image distance D_i is negative, the image is virtual. In a concave lens, both F and D_i are negative. Another useful formula is:

$$\frac{D_o}{D_i} = \frac{S_o}{S_i}$$

With it we can find the distance of the object (D_o), the distance of the image (D_i), the size of the object (S_o), or the size of the image (S_i), if we know the other three facts.

LENTIL. This food plant, akin to the bean and pea, is said to be one of the oldest cultivated by man, and it still is an important article of food in Egypt, Syria, Mexico, etc. The seeds, which are round and flat and under a half-inch in diameter, are made into soup or eaten boiled. The "pottage" for which Esau sold his birthright is said to have been made of these legumes. The vines make excellent fodder for cattle and sheep. Most of the lentils consumed in the United States come from Mediterranean countries.

LEO, POPES. The first of the 13 popes of this name is well called **LEO THE GREAT** (Pope, 440-461) because of his learning and the important part which he played in the theological controversies of the time. (For the story of how he turned back from Rome the fierce king of the Huns, Attila, see Huns.)

LEO III (Pope, 795-816) is chiefly remembered because it was he who placed the imperial crown on the head of Charlemagne, on that memorable Christmas day of the year 800 (see Charlemagne). **LEO IV**

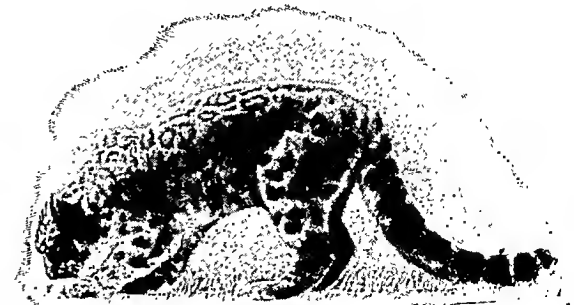
(Pope, 847-855) did much to repair the damages done to Rome by the Saracens, and extended the walls of the city to include the Vatican quarter, on the right bank of the Tiber. **LEO IX** (Pope, 1049-1054) was a German, renowned because of his zeal in spreading the reforms of the monks of Cluny. He became pope through the influence of Emperor Henry III, and brought with him to Rome a young monk Hildebrand, who afterward became the great Gregory VII—the author of the investiture conflict with the emperors.

LEO X (Pope, 1513-1521) was a member of the rich Medici family of Florence, the son of Lorenzo the Magnificent, and was made a cardinal at the early age of 13. The wise and affectionate counsel which his father gave in a letter when the boy first set out for his duties in Rome still exists. He was elected pope on the death of Julius II, at the age of 38. His reign saw the beginning of Luther's revolt against the church, increasing danger to eastern Europe from the Turks, and a continuance of the political struggles and wars involving the Papacy begun by his predecessor. But Leo X is chiefly remembered for his part in the Italian Renaissance, as the liberal patron of Raphael and other artists, and of numerous scholars, poets, and other literary men. It was he chiefly who made Rome the successor of Florence as the literary and artistic capital of Europe.

LEO XIII (Pope, 1878-1903), the latest to bear this name, came to power at a time when the papacy had recently been deprived of its "temporal power" as ruler of Rome and the surrounding country. Like his predecessor, Pius IX, he refused all offers of compromise with the new kingdom of Italy, and remained a "prisoner" in the Vatican. He was a man of wide culture and high character, and in many things showed himself a liberal statesman, though he never ceased to uphold the necessity of restoring to the papacy its temporal power.

LEOPARD. This spotted animal of the cat family inhabits Africa, Asia, and the large islands of the Malay Archipelago. It is smaller than the jaguar,

THE SNOW LEOPARD



This animal, sometimes known as the "ounce," is a resident of the mountains in central Asia.

being about four feet long with a tail three feet in length. There is considerable variation among leopards as to size and color. They usually are pale

fawn or tawny color with dark spots. The under surface of the body is somewhat lighter in color. There are also species which are solid black in color. The larger forms of southern Asia are commonly called "panthers." The leopard lives in the forests, and is a tree climber. It is agile and a remarkable jumper. It attacks the antelope, young cattle, pigs, and occasionally man.

The cheetah or hunting leopard of India is a slim species which is tamed and trained to aid in hunting. The ocelot is another leopard-like cat, with striped and spotted fur, found in tropical America and the southern United States. A full-grown animal weighs 25 pounds. (See Cat; Jaguar.)

Scientific name of common leopard or panther, *Felis pardus*; cheetah, *Gueparda jubata*; ocelot, *Felis pardalis*.

TALKING by MAIL—The Art of LETTER WRITING

LETTER WRITING. "I feel as though I were talking to you," wrote Cicero to a friend nearly two thousand years ago. That is the way to feel when you are writing friendly letters, because such letters are a kind of conversation carried on by mail and should follow the rules of conversation (see Conversation). They take our place when we are absent and should reflect ourselves. Write as you would talk; let your friends share your pleasures. Be natural and sincere in what you say and your letters cannot fail to please. Letter writing as an art began, so far as we know, with Cicero. His letters have the conversational quality and the personal touch that are found in the best letters of all ages.

Letters as a mere form of communication began long before Cicero's time. More than a thousand years before Cicero's time, the rulers of western Asia were keeping up a lively correspondence with the pharaoh of Egypt. A collection of some 300 of their letters written on clay tablets was dug up at Amarna, Egypt, in 1887. From Homer and Herodotus we learn that the ancient Greeks sometimes sent letters. But it was left for the Romans to develop letter writing into an art, since their able men had to spend years in governing distant provinces and could learn what was happening at Rome only from the letters of their intimate friends.

Letters as Literature, and Their Writers

Some letters have expressed so much of the charm and personality of their writers that they are regarded as part of the literature of the world. Two of the most famous letter writers in the English language are William Cowper, the poet, and Charles Lamb, author of 'Essays of Elia' and 'Tales from Shakespeare'. Neither led an exciting life, but they had an affectionate interest in their correspondents and found delight in writing about everyday scenes and events. Jane Carlyle, wife of the famous Thomas Carlyle, won a

place in literature by her lively letters. Another woman remembered for her letters is Madame de Sévigné, a Frenchwoman of the 17th century (see Sévigné, Madame de). Robert Louis Stevenson, William Dean Howells, and William James wrote delightful letters, and, to come nearer our own time, there are the remarkable letters of Walter Hines Page and Woodrow Wilson, and the sparkling correspondence between George Bernard Shaw and Ellen Terry.

Reading such letters will not only entertain you—for who does not enjoy reading a lively personal letter?—but will also inspire you to write more readable letters.

Ethics and Etiquette of Letters

Letters that have been published are for all to read, but other letters are private property. Well-bred persons never open a

A LETTER FROM LEWIS CARROLL



Ch. Ch. Oxford
Mar. 15. 1891.

My dear Enid,

Please tell your Mother I was ever so much surprised, and ever so much pleased, with her letter. And I hope ever so much that she'll bring you here to tea, some afternoon when you happen not to be in a passion: for it won't do to have screaming children in College: it would vex the Dean ever so much. I send you ever so much of my love. Get a hammer, and knock it ever so hard, till it comes in two, and then give Winnie half.

Yours ever so affectionately,
C. L. Dodgson.

Miss Enid Stevens.

Charles L. Dodgson (Lewis Carroll), like Thackeray, made a hobby of illustrating his letters. This charming note is taken from a collection of his letters entitled 'Letters of Lewis Carroll to His Child-Friends'. Apparently he and his little friend Enid have two jokes—one about her excessive use of "ever so much" and the other about her disposition.

letter addressed to another—even to a member of the family, except with permission—or read an opened letter which they find. They do not permit others to read a letter sent them, unless they are sure that the writer would not object. And, to show that they trust others to be equally well bred, they do not seal a letter which is to be delivered by a friend.

Good manners are as important in letter writing as in any other social activity. You want to present a good appearance in correspondence, as in your dress and your speech (see *Etiquette*).

Unruled paper, white or pale gray, blue, or buff, is in good taste for social letters. Fashions in the shape and design of letter paper change slightly from time to time, but paper of fantastic design should never be used. The paper you use for social letters may bear your monogram or your address. More general today are both name and address in lettering which is not too conspicuous.

Good form also requires that letters be written with blue or black ink, not with pencil; that margins be left at both sides and at the top and bottom of the page; that no abbreviations (such as A.M. and Tues.) and no figures be used in the body of the letter, for they give an impression of hastiness which is impolite. The date and the sender's address should never be omitted. If the letter paper does not bear the address this is usually put in the upper right-hand corner of the first sheet, but it may appear at the end of the letter, on the left.

Salutation, Signature, and the Beginning of the Letter

In writing to a mere acquaintance or to someone you have not met, you would probably begin, "My dear Mrs. Sterling"; to a friend or a relative you would say less formally, "Dear John" or perhaps more intimately "Dearest Mary." The correct close for a letter which opens formally with "My dear Mrs. Sterling" is "Sincerely yours."

A more intimate letter may end with "Affectionately yours," "Lovingly yours," or with some other variation which appeals to you. Young people do not use "Faithfully yours" or "Cordially yours." In writing to good friends or to relatives it is more important to be natural and sincere than to follow any set form of closing in your letter.

Except in letters to members of your family and to intimate friends, the proper signature is your first and last names, with a middle name or initial if you prefer. It is not necessary for an unmarried woman to put (Miss) before her name, and those of the best taste do not do it. A married woman signs her name this way:

Edith Wordsworth Prim
(Mrs. Barstow Prim)

or she omits her maiden surname if she chooses.

The start of a letter is important, just as first impressions are important in our contacts with people. Beginning with an apology such as, "I meant to write

you before, but I haven't had time," is uninteresting. It would be pleasanter to say, "I am glad today is a holiday, so that at last I have time to write you." There is nothing amiss in beginning with "I" when that seems natural, but a letter studded with I's appears too full of self. Turning a sentence around will often make the I's less conspicuous. Instead of "I received your letter. I was glad to hear from you," you might say, "You were good to write me that jolly letter while I was ill."

Too few I's are nearly as bad as too many. Chopped-off sentences, such as "Was glad to get your letter" and "Hope you are better," are ungrammatical and abrupt as well.

Letters of Thanks and Informal Invitations

Among the special kinds of letters which must be written from time to time, letters of thanks come first. Writing these promptly shows one's appreciation and is certain to result in more enthusiastic letters.

Mr. and Mrs. Carl Swann Holt

request the honor of your presence

at the marriage of their daughter

Geraldine

to

Mr. Enoch Hoe Garden

Saturday, the tenth of June

at twelve o'clock

St. Mark's Church

Chicago

Invitation to Wedding Ceremony (¾ actual size)

Mr. and Mrs. Carl Swann Holt

request the pleasure of your company

at the wedding breakfast

at half after twelve o'clock

Sixteen Belmont Avenue

Invitation to Wedding Breakfast

To be gracious they should be specific. For example, instead of writing "Thank you for the present you sent me," mention the gift received and tell what you like about it. "Thank you for the book about stamps. It will help me to get my collection in order."

The "bread-and-butter letter" is the one sent to one's hostess after a visit. When you have spent a few days at the home of a friend, you write shortly after your return home not only to this friend but also to the mother of the household. Here is an example:

246 Wilmette Street
Malden, Michigan
July 10, 19—

Dear Mrs. Millmont:

Mother met me when I got off the train and wanted me to tell her at once about the good times I had at your house. It was fun just talking about them. I especially enjoyed the trip to Bald Mountain and the visit to the tile factory and swimming in the river every day. Thank you for all you did for me. Please remember me to Mr. Millmont.

Sincerely (or affectionately) yours,
Marion March

Before young people visit in one another's homes, it is customary for the mothers to exchange letters. But sometimes, when the families know each other well, a daughter may send an invitation in her mother's name.

Dear Lucia,

Mother wants me to ask you to spend the week of August fifth with us at the seashore. There is a good train which gets to Milford at four o'clock, and we could meet you there Monday afternoon. We'll swim, play tennis, and picnic on the beach. I do hope you can come.

Your loving
Emily

Formal Invitations and Replies

Occasionally you will receive a formal invitation to a party or wedding, written or engraved in the third person. In this case your reply is also written in the third person. An acceptance usually begins "Miss Brown is pleased to accept the kind invitation of" and then follows closely the wording of the invitation. By mentioning in your acceptance the date and place and also the hour stated in the invitation, you tell your hostess that you have carefully noted the time and place of the party. Use white note paper four by five inches in size. Never sign or date a formal reply. Invitations frequently have the letters "R. S. V. P." in the lower left-hand corner. They stand for *Répondez s'il vous plaît*, the French for "Reply, if you please." Again, the words "Please reply" may appear on the invitation, but the absence of these reminders does not release you from replying.

When you receive a wedding invitation asking you to the church ceremony only, you need not reply. But if the wedding is to be at home, or if you are invited to the wedding breakfast or reception after the ceremony, you must send an answer. Let us suppose you receive a wedding invitation and a card to the wedding breakfast, like those on the opposite page. You would

answer the invitation to the breakfast only, as in the example below:

Miss Elaine Tennyson
accepts with pleasure
Mr. and Mrs. Carl Swann Holt's
kind invitation to the wedding breakfast
Saturday, the tenth of June
at half after twelve o'clock
at Sixteen Belmont Avenue

The reply to an invitation to a home wedding would begin in the same way, but the latter part could be shortened to

kind invitation
for Saturday, the tenth of June

A note of regret would be written like this:

Mr. Calvin Leighton
regrets that illness
prevents his accepting
Mr. and Mrs. Carl Swann Holt's
kind invitation
for Saturday, the tenth of June

It is not necessary to give the reason for declining an invitation, but it is more polite to do so. It might be "absence from town will prevent his accepting" or "a previous engagement prevents his accepting."

Hostesses who are very particular like to word their formal invitations entirely in the third person. Thus, instead of "request the honor of your presence," such an invitation will read:

request the honor of
Mr. Calvin Leighton's
presence

In an engraved invitation of this type a line is left blank and the name of the person invited is filled in by hand.

Invitations to informal dances or dinners or to teas are frequently written on visiting cards.

How to Write Business Letters

A business letter must above everything else be clear and to the point, but it cannot be effective unless it sounds as natural as talk. Stilted expressions take all the life out of a letter. The roundabout "I beg to acknowledge your favor" and the formal close prevalent in Charles Lamb's time, "I am, Sir, with great respect, your humble servant" are equally out of fashion.

Unnecessary words and insincere phrases are also avoided by good letter writers. For example, "Enclosed is" or "I am enclosing" is preferable to "Enclosed herewith." "Your letter" or "your order" is simpler than "your esteemed favor." And "We are pleased to advise you" is both pompous and useless. Some of the rules for the format of social letters, such as leaving good margins and placing the letter so that it looks well on the page, apply to business letters as well, and should be carefully followed.

One of two endings will serve for nearly all business letters—"Sincerely yours" to one person, whether an acquaintance or a stranger, and "Very truly yours" to a firm. "Respectfully yours" is suitable in a letter

to a person of high position in the church or government, and perhaps in a letter from a young employee to the company head, but not on other occasions.

In business letters it is important to include both the *heading* (the date and the address of the writer) and the *superscription* (the name and address of the person or the company to whom the letter is written).

Following the superscription, a letter to a firm may begin either with "Gentlemen" or with "Dear Sirs." Some think the latter more courteous, but "Gentlemen" is in common use.

Letters of Application

A good letter of application is straightforward, definite, and confident but not boastful. It should sound as if the writer were thinking of the employer's needs and not simply following a form.

2440 Logan Avenue
Atlanta, Ga.
June 18, 19—

Messrs. Gray and Herbert
Lawyers Building
Atlanta, Ga.

Dear Sirs:

Please consider me as an applicant for the position of office assistant which you advertised in today's *Times*.

I have just received my diploma from the West Side High School and am eager to get in an office like yours, since I am especially interested in law.

During the last two summers I worked as a messenger in the Charters National Bank and the Farmers State Bank and learned something about office practise and routine. I can use a typewriter and an adding machine and handle a switchboard.

For information about my character and ability, I can refer you to

Mr. Marshall Drury, Charters National Bank

Mr. E. P. Small, Farmers State Bank

Dr. Wiley Ash, St. Paul's Episcopal Church

I shall be glad to come to your office for an interview at any time you suggest. My telephone number is Hickory 5040.

Very truly yours,
Mark Spencer

In this letter the applicant gives in a few simple paragraphs his education, his interests, his experience—adding a detail or two about the specific things he can do that might be useful to an employer—and his references.

Inquiry and Order Letters

In a letter of inquiry the important thing is to give the information necessary for an answer but no more.

CENTRAL HIGH SCHOOL
GRANADA, ARKANSAS

November 25, 19—

Bombazine Costume Company
259 Forrest Place
Little Rock, Ark.

Gentlemen:

The senior class of Granada High School will present "The Rivals" on December 20. Can you supply us with suitable eighteenth-century costumes? What is the rental charge for costumes of this type?

Very truly yours,
Stephen Story

An order letter must be explicit.

45 Pembroke Road
Cleveland, Ohio
April 15, 19—

R. G. Watson Supply Company
1331 Chester Street
Philadelphia, Pa.

Dear Sirs:

Please send me the following items taken from your Spring Catalog Number 21:

4 baseballs, #617, @\$.25.....	\$1.00
7 baseball gloves, #242, @\$.85.....	5.95
	\$6.95

I enclose a money order for \$6.95.

Very truly yours,
Robert Swenson

The *block form* for the heading and the superscription (shown in the above letters) is preferred today to the *indented form*:

R. G. Watson Supply Company
1331 Chester Street
Philadelphia, Pa.

Punctuation is omitted at the end of lines, except when an abbreviation calls for a period. In business correspondence (but not in social letters) names of states may be abbreviated. It looks better never to abbreviate "street," "avenue," and similar words. The address on the envelope should look like these:

Mrs. Robert South	National Cracker Company
1245 Barren Street	400 West 42nd Street
San Francisco, Calif.	New York, N.Y.

When you write either to a person or to a company requesting a reply that is merely a favor to you, always enclose a stamped, addressed envelope. This is not needed when you inquire about an article that is for sale or apply for a position which has been advertised.

It is important to know how to write a good business letter, for almost all of us have such letters to write.

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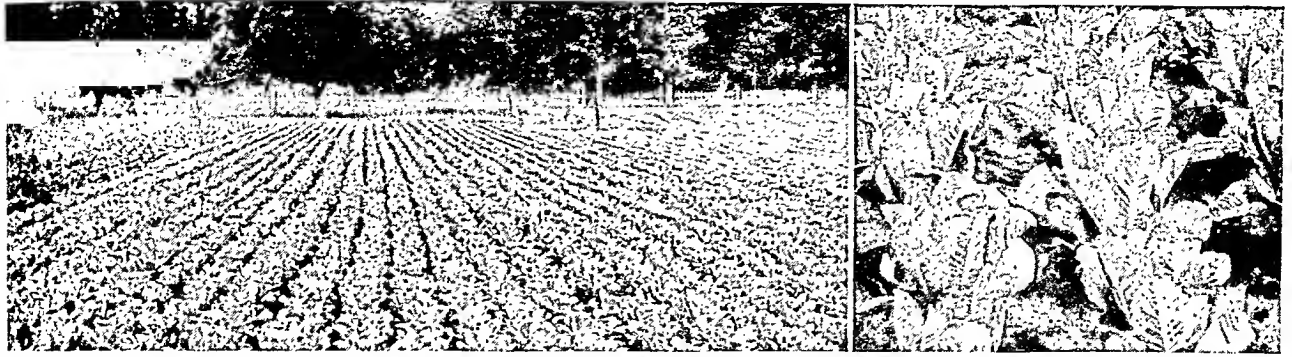
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A COMMERCIAL FIELD OF ROMAINE LETTUCE



This is a field of cos, or romaine lettuce. The picture at the right shows the typical oblong-shaped head, with long leaves. The leaves have thick, crisp midribs. They are medium green on the outside, and become creamy white on the inside of the head.

LETTUCE. The most popular salad green is lettuce. It has been cultivated for more than 2,000 years. The Greek philosopher Aristoxenus, who lived in the 4th century B.C., referred to lettuce as the "green cakes that the earth prepared" for him. The Romans served it at their banquets, and it was raised by Charlemagne. The milky juice in the plant stem was used as a drug to induce sleep. Today many people consider lettuce necessary for a balanced diet.

Lettuce is cultivated for its root leaves. It is a hardy annual which grows best in cool weather. It grows quickly and must be cut for table use before producing its long, slender seed stalk. The small ray flower is yellow. The plant is a member of the family *Compositae*. Its scientific name is *Lactuca sativa*. It probably developed from the wild prickly lettuce, *Lactuca scariola*. There are four chief varieties. Head or cabbage lettuce (*capitata*) is a rosette of close-packed leaves. The head types include iceberg, butterhead, and bib. Leaf lettuce (*crispata*) is a loose, open stalk of crisped, curly, or cut leaves. Cos, or romaine lettuce (*longifolia*), has a long upright column of leaves. Asparagus lettuce (*asparagifolia*) is little used in the United States. The white thick leaf rib is eaten instead of the leaves. California raises most of the nation's lettuce, which it ships to eastern markets throughout the year, and practically all the lettuce seed.

LEWIS, JOHN LLEWELLYN (born 1880). Bulky, stormy John L. Lewis dominated American labor history for years. He fought his way to power as president of the United Mine Workers Union of America (U.M.W.). Later he organized the strong Congress of Industrial Organizations (C.I.O.) and a catch-all union named District 50 (see Labor).

Lewis was born in Lucas, Iowa, the son of a Welsh coal miner. When John was small his father Thomas was "blacklisted" for striking—that is, banned from

mining. The family moved to Colfax, then to Des Moines. After several years the ban was lifted, and they returned to Lucas. John left school after the seventh grade. At 17 he became a coal miner.

The forceful, shaggy-haired boy began to educate himself by reading, especially the Bible and Shakespeare. He was helped by Myrta Edith Bell, a young schoolteacher. Lewis also directed a debating club and staged amateur theatricals. His reading and stagecraft marked the thunderous speeches he later made as a labor leader. In 1901-6 he tramped the West, working at odd jobs. In 1907 he returned and married Myrta Bell. They had two children; Kathryn became his secretary, and John a doctor.

At 26 Lewis was elected delegate to a U.M.W. convention and began his climb to power in the union.

MINERS' UNION HEAD



John L. Lewis, president of the United Mine Workers Union, speaks before a congressional investigating committee.

He served as a legislative agent, field representative, and chief statistician. In 1920 he was elected president of the U.M.W. Lewis' strong leadership won higher wages and more safety for the miners, but his frequent strike orders brought criticism and government fines (see Truman). Since 1947 he has directed the U.M.W. as an independent union. It has grown to a membership of about 600,000, the sixth largest labor union in the nation.

LEWIS, SINCLAIR (1885-1951). The novels that Sinclair Lewis wrote in the 1920's assure him a lasting place in American literature. Nothing he wrote before or after matches his work in 'Main Street' (1920), 'Babbitt' (1922), 'Arrowsmith' (1925), 'Elmer Gantry' (1927), and 'Dodsworth' (1929). In 1930 he won the Nobel prize in literature for 'Babbitt'. He was the first American to receive the award.

In that period Lewis was using material familiar to him. Gopher Prairie, the setting for 'Main Street', is actually Lewis's birthplace, Sauk Center, Minn. Minneapolis, 100 miles away, is renamed Zenith in other books. His father, Dr. Edwin J. Lewis, was a

country doctor; so was Will Kennicott in 'Main Street', and so for a time was Martin Arrowsmith.

As a boy Lewis read everything obtainable, from dime novels to Homer. However, he was no bookworm. He swam in the town swimming hole, hunted rabbits, and played "pom-pom-pullaway" on summer evenings. He was a gangling, freckled-faced boy with red hair. Lewis attended Yale University, graduating

in 1907. Later he frequently returned to Sauk Center to get material for stories.

Years of editorial work and free lancing preceded his first success. He wrote steadily, averaging a book every two years for over 30 years. He also wrote short stories. Lewis was married twice, the second time to Dorothy Thompson, newspaper columnist. Wells, his elder son, was killed in the second World War.

The MEN Who FIRST CROSSED the UNITED STATES

LEWIS AND CLARK EXPEDITION. For years before he became president, Thomas Jefferson wanted to know more about the country west of the Mississippi River. A few traders and trappers had visited parts of the vast wilderness. Men knew that a great river, the Missouri, came from mountains far in the west. Sailing ships had found another great river, the Columbia, on the Pacific side of the mountains. Very little more was known than that.

When Jefferson became president in 1801 he carried out his plan to send an exploring party along these rivers to the Pacific. To lead the expedition, he chose young Capt. Meriwether Lewis. Lewis had made a good name as an army officer and for getting along with the Indians in the Northwest Territory. Awaiting his assignment, Lewis became Jefferson's private secretary in 1801.

In January 1803, Congress appropriated \$2,500 for the expedition. Lewis asked another young veteran from the Northwest, William Clark of Louisville, to share his leadership. Clark had resigned from the army, and he was helping his noted brother, Gen. George Rogers Clark, in the latter's business troubles (see Clark). William Clark rejoined the army and was commissioned a second lieutenant.

Lewis spent some months studying map making and learning how to fix latitude and longitude by astro-

nomical observations. By summer he was ready. Now astonishing news came. At the time, France owned the land west of the Mississippi. Then word came from Paris that Napoleon had sold it all to the United States for 15 million dollars (see Louisiana Purchase). Thus the expedition would be exploring American land.

Start of the Journey

The expedition assembled in Illinois, near St. Louis, in the winter of 1803-4 to make final preparations. On May 14, 1804, the explorers started up the Missouri in a keelboat and two smaller craft. The party consisted of 29 men: the 2 leaders, 14 regular soldiers, 9 volunteers, 2 boatmen, an interpreter who acted also as hunter, and Clark's Negro servant, York.

All summer long they struggled forward against the river's currents, snags, sandbars, and caving banks. Often they had to repair the boats or stop to hunt. By the end of October they had gone about 1,000 miles and reached a village of Mandan Indians, near where Bismarck, N. D. stands today. They sent back letters, maps, plant collections, and even some live animals in cages. Then they settled down to spend the winter.

Although both leaders got along well with the Indians, Clark seemed to interest them more. They liked his flaming hair and called him "Redhead."

Meriwether Lewis was born Aug. 18, 1774, in Albemarle County, Va. His father, a well-to-do planter, died in 1781. His mother remarried, and the family moved to Georgia. There he learned nature lore and hunting. When Meriwether was 13 the family returned to Virginia, near Charlottesville. He joined the militia in 1791 to serve against the Whiskey Rebellion. Next year he received a regular army commission and fought against the Indians in the Northwest Territory. Between campaigns, he learned Indian speech and customs.

In 1803, at the age of 29, he left on his western expedition. After he returned, the president made him governor of the new Louisiana Territory, with headquarters at St. Louis. Two years later, the government repudiated some of his bills. He started for Washington, D.C., by a round-about route. On Oct. 11, 1809, he was found shot to death in an inn near Nashville, Tenn. He may have killed himself or he may have been shot by robbers. The mystery was never explained.



William Clark was born Aug. 1, 1770, in Caroline County, Va. He was the ninth child in a well-to-do plantation family. An elder brother, George Rogers Clark, conquered the Old Northwest during the Revolution. In 1784 the family moved to Louisville, Ky.

William joined the militia to fight the Indians. In 1792 he received a commission in the regular army and served

under General Wayne. He resigned in 1796, but seven years later he rejoined the army to go with Lewis. He was then 33 years old.

After the western expedition of 1803-6, he lived in St. Louis. He was married in 1807 and again in 1820, when his first wife died. He had four children from the first marriage, and one child from the second marriage. Clark served as brigadier general of the Missouri Territory militia and later he became governor of the territory. His great knowledge of Indian life and affairs made him popular with Indian tribes in the area. He died Sept. 1, 1838.

And they were immensely intrigued by York. He was the first Negro they had ever seen.

Bird Woman (Sacagawea) Becomes Guide

It was at this time that they found guides for the expedition. In 1800 a raiding party of Minitari (Hidatsas) had captured a young Shoshone girl far up the river in the mountains. They had sold her to a Frenchman, Tous-saint Charbonneau, who married her. Her Shoshone name was Sacagawea (*sā-kā-gā-wā'á*) meaning "bird woman." (Other spellings are Sacajawea and Sakakawea.) Lewis and Clark hired the couple as guides.

In the spring of 1805 they built canoes for the journey up the Missouri. The party started westward once more on April 7. Sacagawea had a baby boy, whom she carried on her back for the entire trip.

The party struggled against the river for more than a month before they glimpsed the mountains. Then they spent a month carrying their boats 16 miles around the Great Falls of the Missouri. They had to make carts to carry the boats, with wheels cut from tree trunks. On July 25, they reached Three Forks, where three rivers joined to form the Missouri. Lewis and Clark named the rivers Jefferson, Madison, and Gallatin.

The next problem was to find a way over the high mountains just ahead of the Columbia. Sacagawea had the answer. Three Forks was where she had been captured, and she knew her people would be near by. The party started west along the Jefferson and soon met a party of Shoshones. The chief was Sacagawea's brother.

The Shoshones provided the party with guides and horses for the trip through the mountains. They spent a month toiling over the Continental Divide to the Bitterroot River, then crossed the Bitterroot Mountains (near the present site of Lolo, Mont.) to the Clearwater. There they built canoes and paddled down the Clearwater to the Columbia, and then on to the Pacific Ocean.

On Nov. 7, 1805, Clark wrote in his journal: "Great joy in camp.

"BIRD WOMAN"



This statue by Leonard Crunelle at Bismarck, N. D., shows how Sacagawea carried her infant son on the expedition.

We are in view of the Ocean." (This picturesque spelling is Clark's.) Near the site of Astoria, Ore., the party built cabins and a stockade. They named the camp Fort Clatsop after the neighboring Clatsop Indians. There they spent the winter of 1805-6.

The Return Journey

For several years, sailing ships had visited the mouth of the Columbia to get furs from the Indians. Lewis and Clark had considered coming back by ship. But by March not one had appeared; so on March 23, 1806, they started back by land. At the Bitterroot, the party divided, to learn more about the country.

Clark went back toward Three Forks, then followed the Yellowstone to the Missouri. Lewis went north-east to explore a long branch of the Missouri which he named the Marias, after a cousin. At this time he had a skirmish with Indians, the only one of the trip. No one was hurt, but soon afterward one of his men mistook him for a deer, and wounded him. Lewis did not recover until after the party was reunited and had stopped for a rest at the Mandan village. There they left Sacagawea and her family. They reached St. Louis Sept. 23, 1806.

Events After the Expedition

Their return caused great rejoicing, for they had been given up as dead. The two leaders went to Washington and resigned from the army to prepare a record of their journey. They had traveled more than 6,000 miles through wild country. They had made important geographical and scientific discoveries. Over the route they had explored, American settlers and traders soon began to travel. President Jefferson sent them both back to help administer the territory they had explored, from headquarters in St. Louis. Lewis was to be governor of the new Louisiana Territory, and Clark was commissioner of Indian Affairs.

THE EXPEDITION MOVES DOWN THE COLUMBIA



This old print shows Lewis and Clark pushing down the Columbia River toward the Pacific. Behind them in the canoe are Charbonneau (with paddle), his wife, Sacagawea, and their baby, John Baptist. Clark's Negro servant, York, sits in the stern of the canoe. Other members of the expedition follow close behind the leaders.

Lewis met a mysterious death, as told earlier. Clark held his post until he died in 1838. As commissioner he strove constantly for just treatment of the Indians. In 1813 he was made the second governor of Missouri Territory, and he served through the War of 1812. In 1824-25 he was surveyor general for Illinois, Missouri, and Arkansas.

Sacagawea and her family visited St. Louis in 1809. They tried farming, with Clark's help, but failed. In 1811 they returned to the Indian country, leaving the boy with Clark to be educated. There is some question about Sacagawea's death. The clerk at Fort Maniell (on the Missouri near the present boundary between the Dakotas) wrote on Dec. 20, 1812: "this Evening the Wife of Charbonneau a Snake Squaw, died of a putrid fever . . . aged abt 25 years." Most authorities think that the woman was Sacagawea. But some claim that she rejoined her people and lived to be nearly one hundred years old. This would identify her with a "Bazil's mother," who was buried in Shoshone ground April 9, 1884.

LEXINGTON AND CONCORD, BATTLE OF. The American Revolution began on April 19, 1775, with the battle of Lexington and Concord. Some time before, General Gage, the military governor of Massachusetts, had received orders from England to arrest Samuel Adams and John Hancock, accused of stirring up rebellion in the colony. On the night of April 18, Gage sent a detachment of 800 troops to Lexington, where the "traitors" were staying. They were to arrest the two men, then push on to Concord to destroy military supplies stored there by the colonists. News of the expedition leaked out, and two minutemen (as the colonial militia were called), William Dawes and Paul Revere, rode through the country warning that the British regulars were coming.

When the troops reached Lexington they found about 50 minutemen drawn up on the common, an open square in the center of the town. Pitcairn, the British commander, ordered the rebels to disperse. When they refused, the British opened fire, killing eight and wounding ten. The others, too few to fight, scattered, and the British went on toward Concord. Hancock and Adams, warned of their coming, had already fled.

The soldiers arrived at Concord at seven o'clock that morning. During the night the colonists had hidden most of their stores and ammunition. What they had not been able to hide, the British set about destroying. Doing this, they met the minutemen at the old North Bridge over the Concord River and fired upon them. The Americans fired back, and the war was begun. In this skirmish the British numbered about 200, the Americans 400. The Americans poured over the bridge and the British retired, then began their retreat to Boston about noon.

Meantime, the farmers from behind rocks, fences, and buildings picked off the brightly clad soldiers along the road. At Lexington, the fleeing redcoats met another detachment of 1,500 soldiers sent out by General Gage. Thus strengthened the British returned

to Boston, having lost 274 killed and wounded and 25 missing. The American loss was 88 killed and wounded.

At Lexington, 12 miles northwest of Boston, visitors may still see Monroe Tavern, which the British used as their headquarters; Buckman Tavern, the rendezvous of the minutemen; and the Hancock-Clarke house, where Adams and Hancock lodged the night before the battle.

Concord also contains memorials of the struggle there. The most notable is Daniel Chester French's sculptured figure 'The Minute Man', set on a granite pedestal. On it are cut these words of Emerson's:

By the rude bridge that arched the flood,
Their flag to April's breeze unfurled,
Here once the embattled farmers stood
And fired the shot heard round the world.

LIBERIA. This Negro republic on the west coast of Africa just north of the equator is one of the few sections of the continent that is independent of foreign control. It is of special interest to Americans because it was founded as a refuge for liberated slaves from the United States. Its constitution and flag are modeled after those of the United States. Monrovia, its capital and chief port, is named after President James Monroe. It was founded in 1822 by the American Colonization Society as a home for free Negroes. On July 26, 1847, Liberia was proclaimed an independent republic.

Only about 20,000 of the 1,600,000 inhabitants (1948 est.), are descendants of American Negroes. These Americo-Liberians, who are civilized and Christian, share the coast and its vicinity with about 40,000 partly civilized natives. The other inhabitants are "bush" Negroes, living in the interior. These speak only their native tongues, although English is the language of the government.

Liberia is a little larger than Ohio, with an area of 43,000 square miles and a coast line of about 350 miles. Five sixths of it is covered by rain forests that grow dense and tall in the tropical heat and heavy rainfall. The forest people clear gardens by hacking and burning. Liberia's exports include rubber, iron ore, gold, palm-nut oil, piassava fiber, and cacao.

American firms and the government aided in developing Liberia's resources and trade. In 1926 the Firestone Rubber Company leased a vast area where nearly 100,000 acres in rubber trees now produce most of the country's rubber. In 1951 a United States iron company began exporting ore to America from high-grade deposits in the Bomi Hills. The company built Liberia's only railway—43 miles of narrow-gauge road—and a parallel highway to Monrovia.

Defense agreements between Liberia and the United States in the second World War led to building Monrovia's up-to-date harbor and free port and Roberts Field, now an international airport. The United States sent economic and public health missions to Liberia in 1944. In 1951 the United States began a program of technical assistance to improve agriculture and public health under the Point Four Plan.

GIANT SYMBOL OF FREEDOM

LIBERTY, STATUE OF. The giant statue of 'Liberty Enlightening the World' has become the symbol of freedom to the oppressed everywhere. It stands on Bedloe's Island in New York Harbor, its uplifted torch guiding to the New World "the homeless, tempest-tost" of the Old World. The statue was a gift from the people of France to the people of the United States, commemorating the alliance of the two nations during the Revolutionary War.

Edouard de Laboulaye, a French historian, proposed in 1865 that his country present a suitable memorial to the United States on the 100th anniversary of the signing of the Declaration of Independence. The Franco-Prussian War intervened, but in 1874 a young Alsatian sculptor, Frédéric Auguste Bartholdi, was sent to New York to confer with American authorities. As he sailed into the harbor, Bartholdi envisioned a colossal Goddess of Liberty, standing at the gateway to the New World.

The Franco-American Union was formed to collect the necessary funds. The total cost of about one million francs was contributed in France by popular subscription. The people of the United States subscribed \$250,000 for the elaborate pedestal. The statue was dedicated Oct. 28, 1886. (See also Bartholdi.)

In her uplifted right hand the Goddess bears a torch which is lighted by many mercury-vapor lamps. In her left hand is the Tablet of Law bearing in Roman numerals the date July 4, 1776. A broken shackle lies at her feet. The star-shaped wall around the base of the statue is the wall of old Fort Wood, which was built in 1808-11. In 1937 the fort was abandoned and work began on landscaping the entire island of 10.38 acres to provide a proper setting for the Goddess.

The statue was made a national monument in 1924.



The Statue of Liberty, nearly 152 feet tall, stands on a pedestal 150 feet above the water. Within are two spiral stairways leading to an observation room in the crown. The boys and girls peering from the crown windows, in the top picture, show the mammoth size of the head.

On the pedestal of the Statue of Liberty appears the following sonnet composed by Emma Lazarus, entitled 'The New Colossus':

Not like the brazen giant of Greek fame,
With conquering limbs astride from land to land,
Here at our sea-washed, sunset gates shall stand
A mighty woman with a torch, whose flame
Is the imprisoned lightning, and her name
Mother of Exiles. From her beacon-hand
Glowes world-wide welcome; her mild eyes command
The air-bridged harbor that twin cities frame.
"Keep ancient lands, your storied pomp!" cries she
With silent lips. "Give me your tired, your poor,
Your huddled masses yearning to breathe free,
The wretched refuse of your teeming shore.
Send these, the homeless, tempest-tost to me,
I lift my lamp beside the golden door!"

How the Statue Was Made

The figure is composed of more than 300 copper shells, $\frac{3}{32}$ of an inch thick, supported by an iron framework designed by Gustave Eiffel, builder of the Eiffel Tower in Paris. Bartholdi first built a 9-foot model. This was enlarged to a figure 36 feet tall which was divided into sections. Each section was further enlarged to full size and patterns were made over which the copper was hammered by hand. In the assembled statue each section of the shell was bolted to the central framework. The figure weighs 225 tons (100 copper and 125 iron). Its pedestal rests upon a 23,500-ton concrete foundation that reaches down 20 feet to bedrock.

LIBRARIES

from ANCIENT to MODERN TIMES

LIBRARIES. From early times men have had an instinctive desire to record their thoughts and deeds. These first records were crude pictures carved on stone. After men developed alphabets, they began to write books. And later books were collected into libraries. For quite a long time after there were libraries, only a limited number of people could read. So the real power of books was not evident until a great many people began to read them. From that time to this libraries have been in danger whenever a powerful government has wanted to suppress public opinion.

As soon as an absolute dictator has arisen, he has usually written or caused to be written books or pamphlets craftily designed to make people accept his pattern of thought and living. The next step has been to make sure that people read these books and to suppress all books that express contrary opinions. To this end books have been burned and printing presses have been controlled.

But great books have a habit of going underground. Always after dictators have passed, copies of forbidden books have mysteriously reappeared. These have been reprinted and again made available in libraries. Just as dictators and other propagandists have passed, so have their books. Only a few copies have been saved for students of history.

Although some 150 years have passed since the first tax-supported libraries were established, there are only a few nations in which there is a strong belief that free libraries should be available for all the people. And there are still fewer nations where people are allowed to read any books based on fact and honest opinion whether they agree with prevailing political opinions or not.

Among those nations which encourage the establishment of libraries, free from government control of book stocks and free of fees, are the United States, England, Canada, Denmark, Norway, and Sweden.

The United States has led the world in its efforts to provide such libraries for all its people. Even so, only about three-fourths of the people have access to any kind of a public library. Less than half have good libraries which are easily accessible. But every year there are more and better libraries. The time is coming when there will be good service for all.



Two massive stone lions guard the entrance to the central building of the New York Public Library at Fifth Avenue and 42d Street. As one visitor remarked: "These lions seem to symbolize the dignity and power of great books and public libraries."

Libraries of the Ancient World

EXCAVATION of ancient cities in Egypt and Mesopotamia has uncovered some of the early temple and palace libraries. In the ruins of the Karnak Temple at Thebes archeologists found an inscription for a "House of Books." At Thebes they also discovered the tombs of two librarians named Miamun. These librarians were father and son, for the office was hereditary. At Idfu, 50 miles away, a well-preserved library building was uncovered which was known as "The House of Papyrus." A catalog cut into a stone wall of this building tells us that the library contained books on religion, hunting, astrology, astronomy, and many other subjects. When the earliest Egyptian libraries were established we do not know, but some of the great nobles probably had libraries in their palaces as early as 2000 B.C. during the Feudal Age.

Early Egyptians wrote mostly on papyrus sheets made from the papyrus plant which grew along the banks of the Nile. This material was very perishable; hence only a few fragments from the vast collections of Egyptian libraries have survived to our day.

We know a little more about the temple and palace libraries of Babylonia and Assyria than we do about those of Egypt, for in western Asia the writing was done on clay tablets, which are less perishable than papyrus. In Babylonian libraries were works of grammar, poetry, history, science, and religion. Their

keepers were called "men of the written tablets." The first man known to have borne this title was a Babylonian named Amil Anu.

One of the most famous of the Assyrian libraries was at Nineveh. Though this library existed in the reign of Sargón II in the 8th century B.C., it is usually credited to his great-grandson Assurbanipal, who organized and enlarged it. About 22,000 clay tablets from this Assurbanipal library are now in the British Museum.

Greek and Alexandrian Libraries

More than any other ancient people, the Greeks loved learning, and by 500 B.C. reading was a common accomplishment with them. The following century saw the flowering of Greek genius in every department of literature, and scholars and men of wealth began to collect libraries of manuscript books. Plato and Aristotle had large collections. The Greek city-states were the first governments to found and support public libraries.

The most famous library of the ancient world was founded in Alexandria near the close of the 4th century B.C. by the Greek ruler Ptolemy I. Later Ptolemies built up a collection said to have contained more than 700,000 manuscripts. The original library was a part of the great university known as the Museum, but, as the collection grew, a second smaller library was housed in the Serapeum, the Temple of Jupiter Serapis. Scholars from all over the world gathered at these "twin libraries" to study, and scribes came to copy manuscripts. The larger Museum library was partially burned in 47 B.C., when Julius Caesar's troops were fighting an Alexandrian mob; and about A.D. 391 the entire library was destroyed or scattered by order of Theodosius the Great.

The library at Pergamum in Asia Minor was a rival of the Alexandrian collection. Because this city was so energetic in collecting books, Alexandria is said to have refused to sell it papyrus, thus forcing it to turn to the use of parchment. The Pergamum library of 200,000 manuscripts finally became a part of the Alexandrian library. Mark Antony gave it to Cleopatra to compensate for the destruction caused by Caesar.

Roman Collections

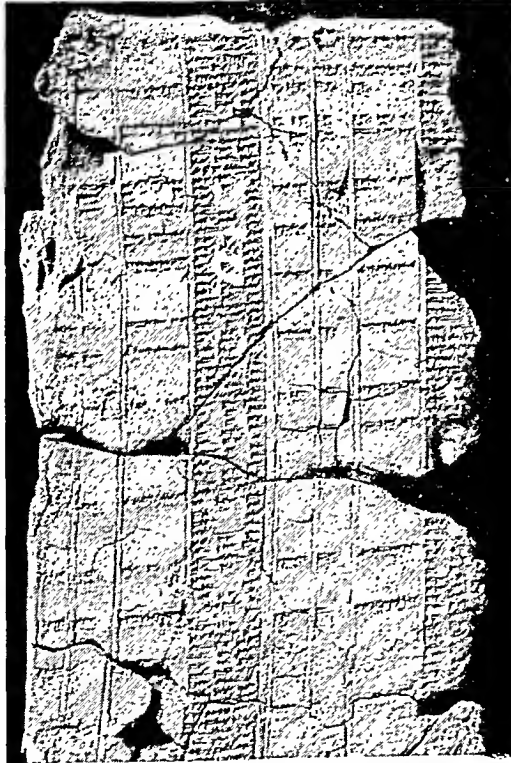
For five hundred years the Romans had no libraries, because they had no native literature. But as Roman generals returned from conquest they brought Greek books home as part of the spoils. Lucius Aemilius

Paulus brought to Rome the library of Perseus of Macedonia. When Sulla conquered Athens in 86 B.C., he brought back the famous library of Aristotle. Caesar is said to have planned the establishment of public libraries in Rome, but he was assassinated before he had carried out his plan. Rome's first public library was founded about 37 B.C., during the reign of Augustus, by Gaius Asinius Pollio.

The most famous Roman library was the Bibliotheca Ulpiana or Ulpian Library. This was founded by the Emperor Trajan, who ruled A.D. 98-117. Early in the 4th century Rome had at least 28 public libraries. Most of these were in temples. When Constantine made Constantinople the capital of the empire, he established there a library which survived for many centuries after the destruction of Rome.

With the decline of Roman civilization, libraries began to perish from neglect. Their fate was finally sealed when Theodosius the Great closed the temples, and the libraries with them, in A.D. 392. The last of the ancient Roman libraries probably disappeared when Rome was pillaged by the Vandals. In spite of this destruction many manuscripts were hidden away and preserved until the time when medieval scribes copied and saved them for posterity.

AN ASSYRIAN DICTIONARY



The Nineveh library, in the British Museum, contains a number of dictionary tablets like this, giving the Sumerian values and the Assyrian names and meanings of the cuneiform signs employed in writing.

The Middle Ages

SOME of the early Christian churches had collections of books. The church at Alexandria is said to have had a library, and Tertullian (about A.D. 200) refers to it as possessing the Hebrew text as well as the Greek version of the Old Testament. Later the Christian church at Jerusalem had a collection of books. Paulinus of Nola speaks of a *secretum* or reading room which was in the church at Nola.

But these collections were small, and the first important library development of the Christian church came through the establishment of libraries in monasteries. Each monastery library had a *scriptorium*, where manuscripts were copied by monks trained for the work. To the monasteries were brought books that had been saved when the ancient libraries were destroyed, and it is due to the patient work of the monks in copying the old manuscripts that so much classical literature has been preserved to our time.

One of the first scriptoriums was established about 550 by the Roman noble Cassiodorus, in a monastery which he founded in southern Italy. Cassiodorus

gathered a large collection of both classical and Christian books, and trained his colleagues in the art of copying manuscripts. Thus began the devotion to literary labors which was one of the traditional glories of Western monasticism. Monastic libraries spread from Italy into England, Ireland, France, Spain, and other countries. (See Books and Bookmaking; Monks and Monasticism.)

As time went on, libraries were also established in cathedrals and a few large churches, some of which

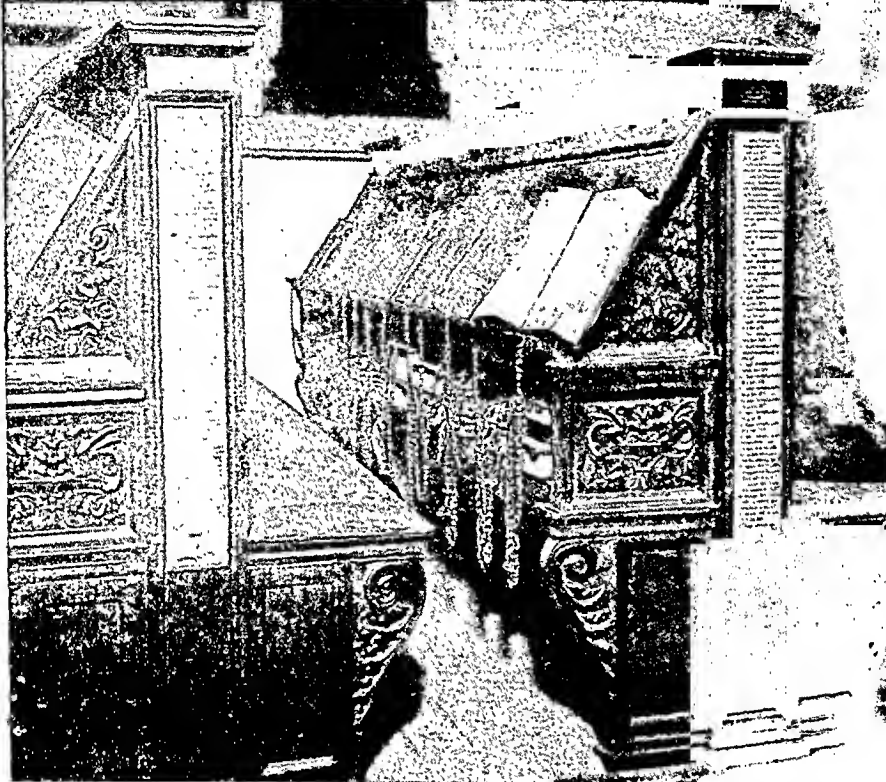
literature, and many important manuscripts were discovered. The Este and Medici families were famous book collectors. About 1440 Cosimo de' Medici established a library in the cloisters of San Marco, which became the first public library of Italy. Later in the 15th century, Duke Federigo founded the Urbino Library, which was subsequently removed to the Vatican.

Among French book collectors of the 14th century, none were better known than the three sons of John II—Charles V, John, Duke of Berri, and Philip the Bold,

Duke of Burgundy. In England the greatest book collector before the age of printing was Humphrey, Duke of Gloucester, who gave many books to Oxford. His brother, Henry V, was renowned for his interest in learning. Another brother, the Duke of Bedford, while regent of France, bought the library of Charles V and presumably took it to England.

With the invention of printing in the 15th century the new interest in learning spread rapidly. Books became cheaper and more numerous, and the development of modern libraries began. (See Renaissance.)

PRICELESS MEDIEVAL BOOKS IN THE LAURENTIAN LIBRARY



Michelangelo designed the splendid building of the Laurentian Library in Florence, which was opened to the public in 1571. Though its collection of printed books and manuscripts is comparatively small, many of the items are priceless because of their rarity and beauty. They represent the fruits of several generations of ardent book collecting in Renaissance days by the princely Medici family. Many of the volumes are still chained to the shelves.

State and University Libraries

THE PRIVATE libraries of kings and great families

were the nucleus of many of the great national and university libraries of Europe. The Bibliothèque Nationale of France, the oldest of these, began with the personal libraries of the kings of France. The first books

in this library probably belonged to Charles VIII (1470–98). During the succeeding centuries, books were given to the library, and some were brought from conquered countries. Today the library has about 6 million books and periodicals and large collections of manuscripts, maps, music, and art objects.

The Mazarine Library in Paris, which was founded in 1643 by Cardinal Mazarin for public use, became a department of the Bibliothèque Nationale in 1930. The Arsenal Library, founded in the 18th century, and the Saint Geneviève Library, which dates from the 17th century, are now closely connected with the Bibliothèque Nationale; each receives a portion of the books deposited in the national library.

The British Isles

The British Museum in London, the national library of England, was founded in 1753. In that year, Sir

came to rival the monasteries as centers of learning and education. When universities arose, they too built up collections of books, many of which came from the monastic and cathedral libraries.

While the clergy of western Europe was thus preserving the Latin classics, the libraries of Constantinople and the monasteries of the East were performing the same service for the Greek classics. One of the important events which led to the Revival of Learning in the later Middle Ages was the emigration of Greek scholars from Constantinople, for they brought to Italy the forgotten treasures of Greek learning.

Libraries and Collectors of the Renaissance

In the Renaissance period, kings, princely families, and churchmen vied in collecting books. In Italy the influence of Petrarch, Boccaccio, Poggio, and other scholars stimulated the search for classical

Hans Sloane left to the nation his natural history and art collection. A few years later, the private library of George II and the Sloane, Harleian, and Cottonian libraries were united under the name of the British Museum and opened to the public. This library, which receives a copy of every book published in the United Kingdom of England, Scotland, Wales, and Northern Ireland, now has more than 5 million books and manuscripts. Its old manuscripts, some of which date from the third century B.C., include early Greek, Hebrew, Latin, and Syriac writings as well as English historical records. Ireland, Scotland, and Wales also have national libraries.

Sir Thomas Bodley established the Bodleian Library at Oxford in 1602. At his death, he left a trust fund to the library, which has since received many gifts. It has more than 1,500,000 books and manuscripts. Its Shakespearean collection is famous and is second only to that of the Folger Library in Washington, D.C. It has a great collection of Biblical manuscripts. Since Bodley obtained for this library the right to receive a copy of every book published in the United Kingdom, the Bodleian Library was regarded as the national library until the opening of the British Museum.

Cambridge University Library contains about 2 million volumes. It began in the 15th century. This library also is entitled to a copy of each book published in the United Kingdom.

Great Italian Libraries

Although there were several earlier papal libraries, the present Vatican Library in Rome was founded by Nicholas V (pope 1447-55). Under Pius XI (pope 1922-39), former librarian of the Vatican, the library was reorganized and cataloged. This work was done under the supervision of Vatican and American librarians with the financial aid of the Carnegie Endowment for International Peace. In 1927 the disused papal stables were remodeled to form an addition to the building. The Vatican Library has more than 700,000 volumes. It is noted for its rare manuscripts, which number almost 75,000.

The Laurentian Library in Florence grew out of the collection begun in the 15th century by Cosimo de' Medici. Among its valuable manuscripts are those of Vergil, the letters of Cicero, Dante's 'Divine Comedy' and some beautiful illuminated manuscripts. The library is now supported by the state. Its building was designed by Michelangelo. A much larger library is the National Central Library of Italy, also in Florence. This library was started when Magliabechi, who died in 1714, left 30,000 volumes for the use of the poor people of Florence. In 1861 this library was nationalized. It contains about 3 million books and periodicals and is the chief center for Italian books.

The chief center for foreign books in Italy is the Vittorio Emanuele National Central Library of Rome. In 1875 this library started with books which had been confiscated from monasteries and convents. There are also national libraries in Palermo, Milan, Naples, Turin, and Venice. While the national

libraries of Italy are not public libraries in the usual sense, their books are available for public use.

Other European Libraries

The largest West German library is the Bavarian State Library in Munich, founded in the 16th century. The former Prussian State Library of Berlin was founded in 1661. After the second World War, this library was split into two parts—the Public Research Library in the eastern section of Berlin and the West German Library in Marburg.

The largest of the Scandinavian national libraries is the University Library of Oslo in Norway. This serves as a national as well as a university library. It has more than a million volumes. The Royal Library of Copenhagen is the largest of the Danish libraries. It was founded in 1665 by Frederick III, and includes one of the world's finest collections of Icelandic literature. The Royal Library in Stockholm is the Swedish National Library. This library and the university libraries at Lund, Uppsala, and Göteborg receive copies of all books printed in Sweden. All are supported by the state.

The All-Union Lenin Public Library at Moscow is the center of library activities of the U.S.S.R. The original building facing the Kremlin is the palace of an 18th-century nobleman. This has recently been supplemented by a 16-story building. This library contains the famous Siku Tuan Shu Collection of 2,000 ancient Chinese books, which were given to Russia by the Chinese government.

The Leningrad National Public Library was formerly called the Imperial Public Library. It began under Catherine the Great (1729-96), who confiscated the library of the Zaluski, a noble family of Poland. Since the Revolution of 1917, the Leningrad library has been greatly enlarged through the addition of large private libraries, such as that of the former royal family. It contains the libraries of Voltaire and Diderot, documents pertaining to the French Revolution, and a large manuscript collection.

Popular Libraries in Europe

It is easy to understand why the popular library development in Europe should have been slow in comparison with that of the United States. For many centuries a strong class tradition existed in most of Europe. This included the conviction that libraries were primarily for scholars. The United States, on the other hand, was founded on the premise that all men were free and equal and should be given equal opportunity. So American public libraries were established along with state and university libraries.

In all fairness, we should also remember that the United States has made great progress in the development of public and school libraries since the beginning of this century. During much of this period, most of Europe has been engaged in wars which were fought on European soil. During the second World War England was repeatedly bombed and Norway and Denmark were occupied by the Nazis. Sweden was on a virtual war footing, although it succeeded in main-

taining a technical neutrality. Yet in all Europe only England and these three Scandinavian countries have systems of popular libraries which to any degree compare with that of the United States.

The British Isles

Circulating libraries for the use of the common people originated in the British Isles. The first town library was organized in 1608 by the English city of Norwich. Early in the 18th century Rev. Dr. Thomas Bray established about 70 libraries in English church parishes.

Subscription libraries were organized as early as 1725. These libraries could be used only by members who paid fees. Closely akin to subscription libraries were the early Mechanics' Institutes, which provided lectures and libraries for workmen. In 1817 Samuel Brown started traveling libraries for the rural people of Scotland.

In 1850 Parliament passed a bill which applied to England and Wales. It permitted towns of 10,000 or more to establish public libraries. In 1853 the act was extended to include Scotland and Ireland.

At first only a few towns took advantage of the law, and the amount of money available was so small that little was accomplished. From 1918 to 1925 laws were passed permitting higher library taxes and providing for the establishment of county libraries. Today in England there are public libraries in all the

owns it. British public libraries are similar to those in the United States. They are supported from local funds, do not charge readers' fees, and are free from state control. The larger library systems operate branches and have separate departments for children. British children's librarians, especially in the larger cities, conduct story hours and celebrate Book Week. They visit schools and welcome school classes to the library. They lend book collections to schools and also serve teachers.

Most free high schools have libraries which consist chiefly of reference books. In 1944 a ruling of the Ministry of Education required that a library be included in every high school built thereafter. Elementary schools for the most part rely upon public libraries.

Scandinavian Countries

The Scandinavian countries are among the most progressive in Europe in their provision for public libraries. In spite of a late start, libraries are now recognized as a vital part of education.

The children's library idea had early support. In 1907 Dr. Munch-Petersen (then Mrs. Valfrid Palmgren) returned to Sweden after a tour of American libraries. She immediately started to raise funds for a children's library in Stockholm. This library, opened in 1911, was the first European adaptation of the American idea of library service to children. Later it

became a part of the Stockholm Public Library.

Denmark has a library system which brings its libraries into close cooperation and encourages the development of libraries in even small villages. Libraries meeting certain standards receive government grants, which for small libraries sometimes amount to 80 per cent of local appropriations. Thirty-three public libraries in cities and larger towns are designated as "central libraries." These receive extra grants from the government for serving li-

braries and individuals in smaller communities. Any individual may borrow a book of information from the central library in his district or from the state library at Aarhus. Denmark also has some independent children's libraries which receive state aid.

Both Sweden and Norway have adopted this Danish "central library" plan. In Norway, Sweden, and Denmark the national governments exercise some control over libraries through supervisors known as state library inspectors. According to reports, public libraries welcome these inspectors and regard them as consultants rather than "watch dogs." Through laws recently passed in both Denmark and Norway, authors

AN ENGLISH LIBRARY IN MODERN STYLE



The modern style of architecture is well adapted to the needs of the public library. This is the Southfields Library, a branch of the public library in Leicester, England.

large cities and in many smaller ones. County libraries have grown in number and some form of library service is available in almost every section. The greatest factor in county library development has been the financial aid given by the Carnegie United Kingdom Trust.

The National Central Library in London is the hub of a cooperative system which enables anyone in the United Kingdom to borrow almost any book he needs. For example, if someone in Liverpool wants to read a specialized book not in his city library, he may borrow it from the National Central Library, or that library will borrow it for him from the library which

CHILDREN IN SCANDINAVIAN PUBLIC LIBRARIES



Many Scandinavian public libraries have attractive children's rooms where activities are similar to those in the United States. 1. Here the Children's Department of the Deichman Public Library in Oslo, Norway, exhibits an attractive collection of "children's books from many lands." The books are placed within easy reach of the children. 2. In Danish libraries, boys and girls use card catalogs just as American children do. 3. Storytelling has a universal appeal for children everywhere. These Swedish children in the Stockholm Public Library may be listening to a Norse myth or a Hans Christian Andersen fairy tale; or the story may have come from England or the United States.

receive money in the form of royalties from the state. An author's royalty is based on the public library circulation of his books.

Although Norway had public libraries all through the 19th century, the modern library movement dates from the early 1900's. In 1898 the Deichman Library in Oslo was reorganized along modern lines and has served as a model for Norwegian libraries. In 1947 Norway passed a law requiring cities and towns to maintain both public and school libraries. Both kinds of libraries are aided by government grants.

In Sweden both municipal public libraries and those maintained by study circles receive government grants. The largest public library is in Stockholm.

France, Belgium, the Netherlands,
and Southern Europe

France has not made much public library progress. The chief growth has come since 1945 when the National Office of Public Libraries and Public Reading was established. Its libraries are usually small, poorly supported, and are open only a few hours a week. Private organizations operate some libraries which are

open to the public. Some rural service is given in various sections of the country by bookmobiles operating out of central depots.

Some French libraries provide service for children. American children's librarians, who assisted in the work of French reconstruction after 1920, helped to get this work started. One of the most interesting children's departments is in the public library at Soissons. Its establishment was made possible by an American woman who left money to purchase a collection of the best children's books. In Paris a model children's library, *L'Heure Joyeuse* (The Happy Hour), also equipped by Americans, acts as an information center for other French children's libraries.

Lack of funds and disagreement among the people retard library development in Belgium and the Netherlands. In both countries, Catholics and Calvinists maintain libraries in the same small towns, and there may even be a third or neutral library. They are supported by small financial grants from the city, provincial, and national governments, and from private contributions. But funds are so inadequate that the libraries reach only a limited number of the people. In Belgium the director-general for libraries in the Ministry of Public Instruction administers state grants for public libraries and supervises them. In the Netherlands the state subsidized Central Association of Traveling Libraries lends small collections of books to small towns and rural communities from Amsterdam.

One of the most interesting libraries in Holland is a children's library in Amsterdam supported by the Society for the General Good. In addition to lending books to children, this library works with parents and provides materials on child psychology and children's reading habits. It has a branch at the Amsterdam Zoo which specializes in nature books.

Little can be said about public libraries in Spain, Italy, and the Balkans. The library movement in these countries lags far behind that of northern Europe.

Germany

German popular libraries are located mostly in large cities. Under Hitler all German libraries came under the control of the government propaganda agency. Libraries were forced to emphasize books which glorified Hitler and the Nazi party, and many books were burned at the whim of the Nazis. During the second World War, many library buildings and vast numbers of books were destroyed by bombs.

In September 1949 the International Youth Library opened in Munich. This is financed by gifts of money and books from groups in various countries and by a grant from the Rockefeller Foundation. Books are being collected from many countries. Those in charge strive to develop international understanding through the use of books and through discussions, story hours, and exhibits.

Behind the Iron Curtain

Russia has a large number of libraries and has gone a long way toward abolishing illiteracy. But independent thinking and reading do not fit in with the

policy of the present Soviet government. While people are encouraged to use libraries, all books are subject to rigid government censorship. Each library includes books which promote Communism, and those presenting a contrary point of view are not available. All libraries are under the general supervision of the People's Commissariat of Education. Libraries in the other countries behind the Iron Curtain have similar rigid controls.

Libraries in the United States

THE LIBRARIES established in the United States during the colonial period and in the first years of the republic naturally followed the pattern which had been set in England. Among the first lending libraries were parish libraries sent by the same Dr. Thomas Bray who started parish libraries in England. In 1731 Benjamin Franklin founded the first subscription library called "The Library Company of Philadelphia." "At the time I established myself in Pennsylvania," writes Franklin in his 'Autobiography', "there was not a good bookseller's shop in any of the colonies to the southward of Boston. . . . And now I set on foot my first proposal of a public nature, that for a subscription library. . . . I drew up the proposals . . . and . . . procured 50 subscribers of forty shillings each to begin with, and ten shillings a year for fifty years."

Franklin's library still exists. Other early subscription libraries which still function are the Boston Athenaeum and the Charleston Library Society. About 1820, mercantile and apprentice libraries were started in New York City and other large eastern cities for the employees of business houses.

Tax-Supported Libraries

The first library in the United States known to have received town support was at Salisbury, Conn. This had been started by a gift in 1803, and municipal support was voted in 1810. The public library at Peterborough, N. H., founded in 1833, is probably the oldest existing library which has had continuous tax support.

New York, New Hampshire, and Massachusetts were the first states to pass laws permitting the establishment of tax-supported public libraries, and Boston was the first city to maintain a public library of any great importance. From these early beginnings, public libraries spread rapidly. Among the cities which established tax-supported public libraries before 1880 were Cincinnati, Cleveland, Detroit, Chicago, and Los Angeles.

These early public libraries were founded upon certain basic principles which explain the later popularity of the library movement. First of all, public libraries were never imposed upon the American people by the state or national government. They were organized by groups of citizens who cheerfully taxed themselves because they wanted libraries. In the United States libraries were not planned for the exclusive use of the privileged classes, as in so many European countries. They did not spring from a

charitable desire to do something for the poor, as in England. They were established for the use of all the people.

Modern Library Movement

The American public library movement took on real momentum about 1876. In that year about a hundred librarians met at the Philadelphia Centennial Exhibition and formed the American Library Association. These pioneer librarians were men and women of vision.

Melvil Dewey, one of the group who called the first conference, invented the Dewey decimal classification system which made possible a simple and orderly book arrangement. Books were placed on open shelves, so that people could have direct access to them. Children's departments were opened. Library schools were founded to train librarians in new methods of service. State library agencies were established.

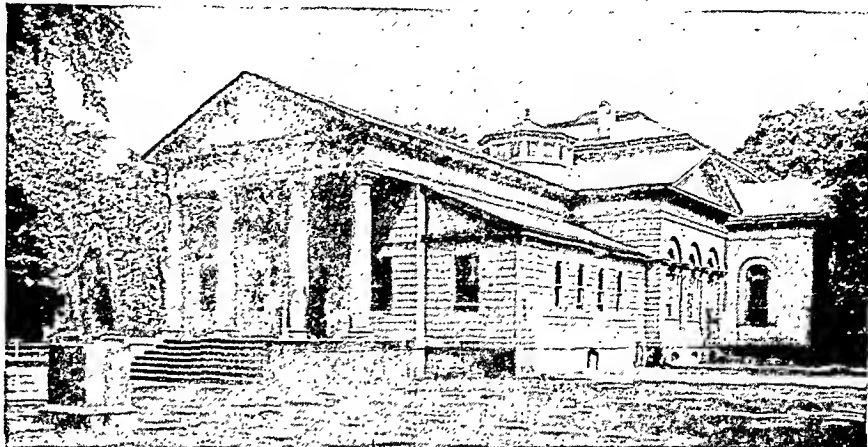
Librarians wrote and talked about libraries and the services which they could render to the people. The contagion spread. Men and women in cities, towns, and villages organized clubs or associations which had as their goal the organization or improvement of local public libraries. Interest in libraries received its greatest stimulus when in 1881 Andrew Carnegie began his gifts for the erection of free public libraries. By 1917, when gifts for library buildings were discontinued, more than \$41,000,000 had been given for 1,681 buildings in the United States. (See Carnegie.)

The Modern Public Library

FOR MORE than a hundred years people in the United States thought of public libraries in terms of cities and towns. While urban libraries permitted near-by farmers to borrow books, no one thought it possible to have as good libraries in rural areas as in cities and towns. It was the automobile and the subsequent building of good highways that led to the organization of county and regional libraries so that people on farms and in villages could have easy access to books. The rural library program is still in its infancy but is growing rapidly. The United States will not have a truly adequate public library system until this network of rural libraries is completed.

Official reports as to the number of tax-supported public libraries in the United States do not always agree, but the actual number is somewhere between 7,000

REDWOOD LIBRARY, NEWPORT, R. I.



This is the oldest library building in the United States which has been in continuous use. It was erected in 1750. Some additions have been made since then.

and 7,500. Many of these are county, regional, and city library systems. These include numerous branches, some of which are quite large. In this estimate, a library system counts as a single library. American public libraries lend nearly half a billion books a year and countless people use their reference and picture collections, reading rooms, record rooms, etc.

City and Town Systems

Most large cities have excellent library systems. The New York Public Library has the largest book collection of any public library in the world. Its more than 5 million volumes include an endowed central reference collection of about 3 million volumes. This library serves three of the five boroughs which make up greater New York. Brooklyn Borough and Queens Borough have their own fine library systems.

According to a 1952 report of the Office of Education of the Department of Health, Education, and Welfare, public libraries in five cities have an annual circulation of more than 5 million books each. The cities are New York, Chicago, Los Angeles, the borough of Brooklyn, and Cleveland. These figures do not, of course, include the circulation of recordings, films, and other nonbook materials.

THE PUBLIC LIBRARY IN KILGORE, TEX.



This is a comparatively new building in a small town in eastern Texas. The library is inviting in appearance and is air-conditioned for comfort.

Branch libraries have long been important in city library systems, but as the size of metropolitan areas has increased they have grown in number, size, and efficiency. The number of branches in a system ranges from five or six in smaller cities to sixty or more in the largest ones. A branch library has its own collection of books selected to fit the needs and interests of its community. It draws on the central library for books not in its collection.

In recent years many cities have grown so rapidly that new residential sections have developed on their outskirts. Limited library appropriations and high rental and building costs have made it impossible to provide branch libraries in all of these areas. So many of them are served through bookmobiles which carry fairly large book collections.

The major services of a public library are divided into two parts. One includes all services which have to do with lending materials. The other has to do with the patron's use of materials within the library walls. For convenience we refer to the first as circulation and to the second as reference.

In modern practise these two services are often combined. An art, music, or technical department may include reference books which are not circulated. In these departments patrons may borrow books, blueprints, pictures, etc., without going to the main loan desk of the library.

While public libraries concentrate chiefly on books and other printed matter, there is a growing tendency to include other materials which have to do with communication. Among these are films and phonograph records. A few libraries even lend framed paintings and prints. Librarians are using every possible means to project services into their communities so that people will think of the public library in connection with any worthwhile project from the rearing of a child to the planning of a municipal center.

Special Services

Most city library systems provide special collections for businessmen, craftsmen, and industrial workers. Often there is a special business branch in the heart of the business section, and there are some library branches in factories. Collections of books in foreign languages are maintained for students and people who cannot read English. In some libraries books printed in raised type or transcribed on phonograph records are lent to the blind. Readers' advisers give helpful book information to individuals or study groups. Most libraries provide special services for people who are

physically or mentally ill and lend books to hospitals which do not have libraries.

The Louisville Public Library is the first library to own and operate a radio station. Both professional and ham radio operators donate their services to help run this FM station. The Board of Education and the school administrators coöperate, and programs during school hours are directed chiefly to school needs. Later programs include rebroadcasts of other worth-while radio programs and transcriptions of interesting happenings in the city. On the various programs library department heads make spot announcements of interesting library news or services, and so publicize the library.

No one, of course, would suggest that any public library should operate a radio station at the expense of any essential services. But when the city council, board of education, and library trustees of a large city so recognize the educational values of radio that they establish a station, secure special funds for its maintenance, and delegate to the public library the responsibility for handling it, the event should be recorded.

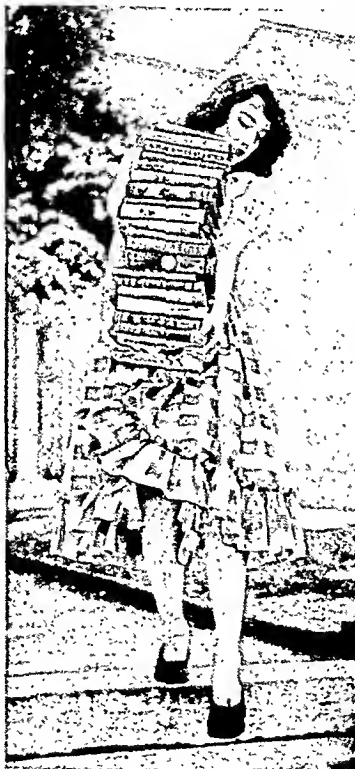
Smaller Cities and Towns

Every city public library does not give all the services highlighted in the preceding paragraphs. Libraries in smaller cities and towns attempt only a few of them. The quality of a library's service is not measured by the impressive list of special services which it features. After all, the real question is: What percentage of the people of a city or town use the service of the public library and how much does the library contribute to their welfare and education?"

In a town, librarians have the opportunity to know the leaders in every municipal activity and to build services around those activities. In many towns the library is the meeting place for such groups as Boy and Girl Scouts, women's clubs, and various civic councils. The librarian knows in advance what local projects are in the offing and often serves as a member of the planning committee. So books which will be needed can be purchased or borrowed from a larger library.

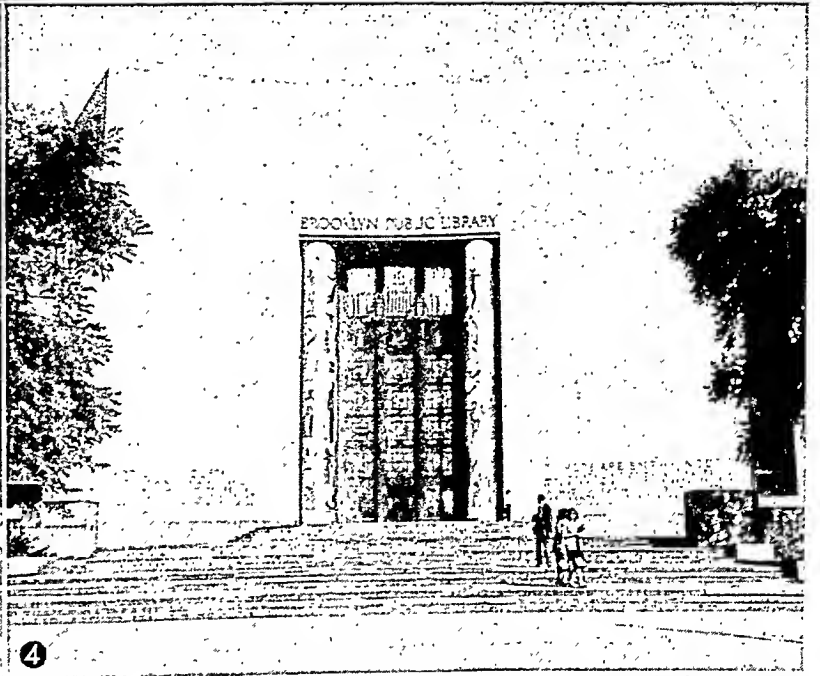
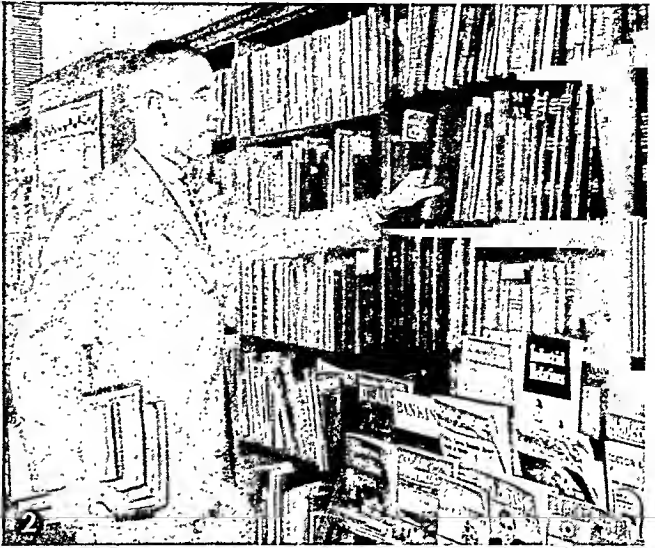
And best of all, no elaborate arrangements have to be set up to let people know that the needed materials are in the library. Direct publicity is always the best publicity, and a fifteen-minute talk by the librarian at a community gathering often accomplishes more than a thousand circulars. As for the town newspapers, if library services make news, reporters are eager to write about them. It is only dull would-be publicity stories that are shunned.

AN "ARMLoad" OF BOOKS



The last stop for the New Rochelle Public Library bookmobile is the railway station. This young librarian is replenishing the depleted book stock.

THE MODERN PUBLIC LIBRARY ACCENTS SERVICE



1. In the record room of the Detroit Public Library, patrons are provided with ear phones. 2. The best books and periodicals needed by businessmen are in this department of the Enoch Pratt Free Library in Baltimore, Md. 3. Windows of the Enoch Pratt Free Library are on the street level and its window exhibits are famous. 4. The "ultra modern" Brooklyn Public Library Building is one of the newest city library buildings in the United States.

Even a branch of a city library does not have quite the same opportunity for service that the small city or town library has. The adults of a city community often work in other areas and belong to organizations which meet elsewhere. In other words, all activities of a city residential community do not center in the neighborhood served by a branch.

The small city or town library usually faces the problem of limited funds for staff, books, and other materials. Forward-looking librarians feel that the solution will come either through some regional organization or through some plan in which libraries maintain their individual independence, but pool part of their funds for the purchase of expensive or infrequently used materials.

There are many signs that coöperation between libraries is increasing. For example, the Public Library in Racine, Wis., has arranged to borrow books and films from the library in a larger neighboring city, Milwaukee. These two libraries have dramatized and speeded up service through the use of teletype. A messenger commutes daily between the two cities, and the patron who has asked for something one day gets it the next or even that same day.

County and Regional Libraries

COUNTY and regional libraries are alike in that they serve all the people in an area instead of limiting service to those who live in towns and cities. It is logical that county libraries should

have been the first of these larger systems to be established, for in all sections of the United States except New England the county is a strong political unit. A region which disregards county lines is often a more logical library unit than a county, but the difficulties of financing regional library systems are such that it is almost impossible to organize them without the help of state or federal funds. Thus regional libraries in the South began in the area of the Tennessee Valley Authority and were aided by federal funds appropriated by the TVA.

Vermont is using state funds to coördinate its public libraries into five regions. Bookmobiles operating

demonstrations. The State Library sets up a complete library in a parish. A trained staff and a good book stock are provided, and the state usually supplies a bookmobile. The parish provides space for headquarters and branches and pays for furniture, utilities, and some other items. If at the end of a year the parish decides that the library should be continued, the state leaves the entire book stock there. At this point the parish begins to assume the full responsibility for the support of the library.

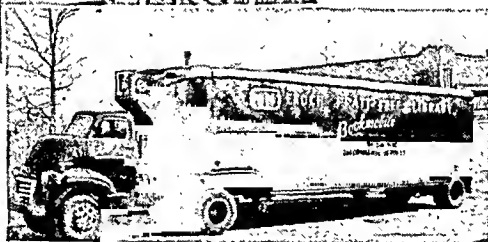
Extent of County and Regional Libraries

According to a survey made by the editors of this encyclopedia in 1949, there were 698 independent county library systems in the United States. In addition, 213 counties contracted with existing city or town libraries for service, and 181 counties were served through 58 regional library systems. The United States has more than 3,000 counties of which 1,092 have some county or regional library service. (For information about the libraries in any state, see the Fact Summary on that state.)

As has been indicated, regional libraries in the United States are still too few to have much bearing on the library picture. County libraries, on the other hand, have been developing rather rapidly in the past quarter century. By 1950 every state except Idaho had legislation permitting the establishment of county or regional libraries. Most of the county libraries are in the South, the Middle West, and on the West coast. A few states in these areas have no county libraries. A few states outside these areas do have them.

A study of county and regional libraries shows that such libraries have been organized most readily in states which did not already have many town and city libraries, or where, through state or federal appropriations, small libraries

This modern branch library on wheels was made to specifications for the Enoch Pratt Free Library at Baltimore, Md. The trailer is 32 feet long and over 7 feet wide. It houses two desks and shelving for a very large book stock and is conveniently arranged for both patrons and librarians. There is a separate section for children's books.



from a headquarters library in each region deliver books to small libraries, rural schools, and even to farm homes. New York, Illinois, and Massachusetts are among the other northern states which are using state funds in regional experiments or for services designed to promote regional library development.

State Aid

State aid has also been an important factor in the organization of county libraries. That this aid is not absolutely essential has been proved in California. This state has the most complete system of county libraries in the United States, yet these libraries have always been completely financed by the individual counties.

State aid is used in various ways. Some states make appropriations to aid existing county and regional systems. In Louisiana, on the other hand, state funds are used chiefly to finance parish (county)

have been induced to merge into larger units. It is easier to give good rural service in states where people live fairly close together and where roads are kept open all winter. For these conditions are essential to good bookmobile service. What is most needed is the development of some practical regional plans for rural library service in the western plains and mountain states. In those states there are many thinly populated areas. Towns are often far apart, and many roads are not continuously open during the winter months.

How a County Library Operates

Library systems which undertake to give library service to all the people in a largely rural county range from the Fresno County Free Library in California, with an annual income of approximately \$400,000, to a tiny county system in South Dakota or Mississippi which often has less than \$3,000 a year to spend.

In general, a large county library offers the same services as a large city library. A small county library operates more like a library in a small town. In all county library systems the main emphasis is on getting books out to people in all parts of the county. The main library serves as a distributing center and comparatively little space is devoted to reading rooms and other service departments which one finds in a city library. While the Los Angeles County Library spends about a million dollars a year, a casual visitor might be surprised at the modest appearance of its Los Angeles headquarters as compared with the beautiful Los Angeles City Library. The same is true of Cuyahoga County Library headquarters in Cleveland and Wayne County Library headquarters in Detroit as compared with the main libraries of the two city systems.

County libraries operate branch libraries in towns in the county. There are so many towns in Cuyahoga County that the county is being divided into three regions with a headquarters library in each one. Unless a county makes some other arrangement, county libraries with adequate appropriations give extensive service to schools. In many instances, all the school libraries in a county are administered from county library headquarters. There the books for school libraries are purchased and prepared for use. Then they are placed in the school libraries.

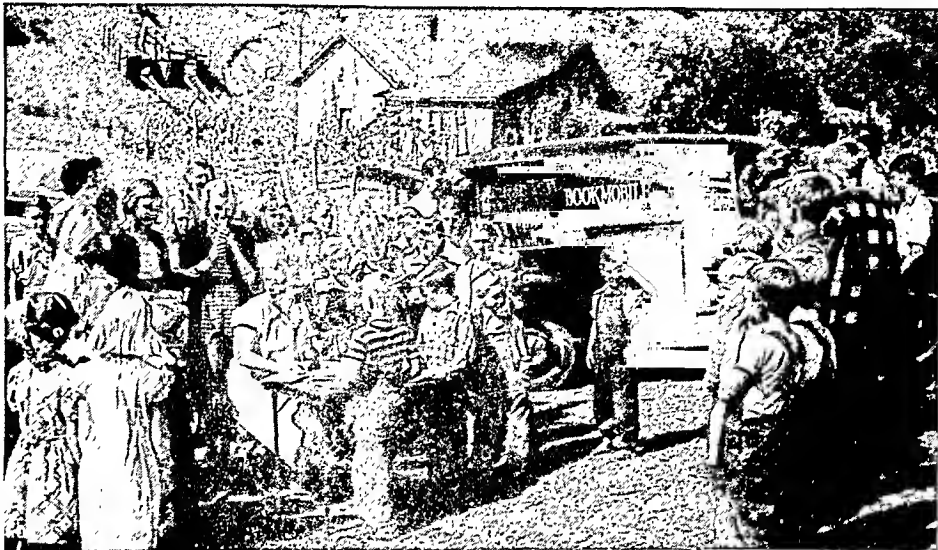
The operation of a regional library system is much like that of a county system.

Use of Bookmobiles

Most county and regional libraries make extensive use of bookmobiles. According to a 1952 report, in North Carolina 89 bookmobiles were used to service 91 of the state's 100 counties. A bookmobile is a miniature library on wheels which travels on a circuit and makes regular stops at community centers and at schools. It often stops at crossroads to serve farm homes, and some librarians use a public address system to announce their arrival.

The size of a book collection depends on the capacity

LIBRARY SERVICE IN THE KENTUCKY MOUNTAINS



Bell County in Kentucky contracts with the Pineville Public Library to give service to its people. The children of Cary School look forward to the day when the bookmobile will arrive and they can exchange their books. Thirty-nine schools are served in this way.

of a bookmobile and ranges from 400 to 4,000 volumes. Bookmobiles vary in type. They include trailers, busses, trucks, and station wagons. Nevada's first bookmobile was a converted ambulance purchased for the Washoe County Library from army surplus stocks after the second World War. In sparsely settled western states where bookmobile service is impractical, county libraries mail books to remote farm homes.

First County Libraries

County libraries began in 1898 in Ohio. In that year the Brumback Library was founded to give service to Van Wert County. That same year, the Ohio legislature passed a law which permitted the Cincinnati Public Library to extend service to all the people in Hamilton County. In 1898, also, a library was incorporated in Washington County, Md. The state legislature passed an act permitting Washington County to make an annual appropriation for its support.

In 1905 this Washington County Library, with headquarters at Hagerstown, used a horse-drawn bookwagon to distribute books to rural readers. Mary Titcomb, the librarian, planned this first bookwagon, the forerunner of the modern bookmobile.

Public Library Inquiry

In 1949 a survey of a cross section of public libraries in the United States was completed and the first reports published. The American Library Association had long urged this survey. It was made by the Social Science Research Council and was financed by the Carnegie Corporation of New York. In 1950 a general report of this Public Library

IN RAPIDES PARISH, LA.



Too small for a branch of the parish library, the Czech settlement at Kolin is served by the parish bookmobile, which makes regular stops.

Inquiry was published in book form. This was prepared by Dr. Robert D. Leigh, director of the survey. In 'The Public Library in the United States' Dr. Leigh summarizes earlier and more detailed reports.

No attempt will be made to analyze this important book here, but one of its findings should be noted in any discussion of American libraries. According to the report, children and young people below voting age make up about one-half of the registered borrowers in public libraries. About 60 per cent of all books lent are borrowed by readers in this same age group. Boys and girls under the age of fifteen account for one-third of the registration and almost half of the circulation. The report points out that public libraries lose a high percentage of readers after they leave school.

As a result of this report, work with children and young people in both public and school libraries has been brought into sharp focus. Those who have given the whole problem thoughtful consideration agree that boys and girls should be familiar with the adult department of the public library before they leave school. This requires extensive coöperation between school administrators and librarians of school and public libraries and more accent on service for young people in public libraries.

Children's Libraries—An American Achievement

children's books come together in an atmosphere of freedom which makes for pure enjoyment. Children

CHILDREN ARE SERVED BY A BOOKMOBILE



These little girls have decided to read in comfort while the bookmobile of the New Rochelle Public Library parks in the neighborhood of their homes.

CHILDREN OF PRESCHOOL AGE



This is a story hour held each week at the East 131st Street Branch of the Cleveland Public Library. These tiny children celebrate their birthdays here and love to join in reciting nursery rhymes and in playing hand-clapping games.

talk with librarians and with each other as naturally as though they were in their own homes.

A visitor to a busy branch library gives a picture of the children's room which is typical of many hundreds throughout the United States: "It was about four o'clock in the afternoon and neighborhood schools had closed. A long line of children was passing the desk where books were returned. Another line was forming near the desk where books were checked out. Children were all about the room, selecting books from open shelves or reading at low tables. At one table a librarian was helping a group of children on a school assignment. At another several boys were poring over books which gave detailed instructions for making kites. Earnestly they discussed the merits of different models. At a corner table sat two little girls who had discovered a book of familiar songs. They sang some of them, but softly, as small children do when they are not performing for grown-ups. And no one even suggested that singing was not proper in a library!"

On Saturday mornings children usually gather in the children's room to listen to stories. In one children's room a children's librarian, who is also an artist, works every Saturday with a group of children who like to draw and paint. Recently in the Hudson Park Branch in New York City there was an exhibit of original drawings by Marcia Brown. Children from the neighborhood crowded around the pictures from 'Little Carousel'. They bubbled with interest for there was their own familiar Sullivan Street and the little carousel was the one that came there every spring.

No wonder a distinguished Danish librarian made the following comment after visiting some of the children's rooms in the United States: "I was prepared for

everything else I have seen in America, but these children's libraries are amazing. They surprise and delight me. They are truly democratic."

In the report discussed in the preceding section of this article, Dr. Leigh refers to the skill and personal effectiveness of children's librarians and to their knowledge of children's literature. He says that "children's rooms and children's librarians have been the classic success of the public library."

The First Children's Libraries

A genuine interest in children's reading preceded the organization of children's libraries. It found partial expression in school library collections, Sunday-school libraries, and in children's magazines such as *St. Nicholas* and *The Youth's Companion*.

About the time of the organization of the American Library Association (1876) some library leaders became concerned because only adults were considered in public library planning. Dr. W. F. Poole, librarian of the Chicago Public Library, expressed his interest in children at a meeting of British librarians held in London in 1877. He said: "I could never see the propriety of excluding young people from a library any more than from a church. From 10 to 14 years is the formative period of their lives."

There is an interesting record of the establishment of a "juvenile library" in West Cambridge, Mass., in 1835. Dr. Ebenezer Learned left \$100 for children's books which were to be chosen by the selectmen, ministers, and physicians of the town. The first reading room set aside for the use of children was in the Public Library of Brookline, Mass. The Minneapolis Public Library in 1893 established a children's department from which books circulated. In 1894 the Cambridge Public Library and the Denver Public Library opened children's rooms. In 1895 Boston, Omaha, Seattle, and San Francisco opened circulating libraries and reading rooms for children; and in 1896 Detroit, Buffalo, Pittsburgh, Everett (Mass.), Kalamazoo (Mich.), and Pratt Institute of Brooklyn followed.

Training of Children's Librarians

Children's work was no sooner established than the need of special training for children's librarians became evident. The Library School of Pratt Institute established such a course in 1898. This course was temporarily discontinued in 1900 and was not resumed until later. In 1900 a class to train children's librarians for the Carnegie Library of Pittsburgh was organized. In 1901 this class broadened its purpose

and became the Training School for Children's Librarians. From these and other library schools established later, leaders have gone out to many cities of the United States and Canada.

Storytelling and Reading Clubs

When cities began to provide playgrounds and to build field houses in parks, a new opportunity for library service opened. Henry E. Legler, then librarian of the Chicago Public Library, and others started reading rooms and book delivery stations in these field houses. Storytelling was given its place in this extension of library service, not only in Chicago but in similar centers in Pittsburgh, Boston, New York, Cleveland, and other cities (see Storytelling). The

NO "HANDS OFF" SIGN ON THIS BOOK EXHIBIT



At the Lake View Branch of the Chicago Public Library the boys and girls look over a collection of Caldecott and Newbery prize-winning books. This beautiful children's room is crowded every afternoon after school hours.

Cleveland Public Library, under the direction of William H. Brett and Linda A. Eastman, fostered reading clubs for young people and began coöperation with the Cleveland Museum of Art.

Special Buildings for Boys and Girls

A building for the use of children had been the dream of many a librarian. It was first realized in 1914, when the Brownsville Children's Library, a branch of the Brooklyn Public Library, opened in one of the most congested foreign neighborhoods. The first such library in Canada was opened in 1923, when the Toronto Public Library opened Boys and Girls House. At Westbury, Long Island, is the Robert Bacon Memorial Children's Library (1924). This library is in a rural setting and is distinguished for its decoration, equipment, and the variety and rarity of its books.

Raising the Standards of Children's Books

The achievement of children's librarians in getting good books written, illustrated, and published is

unique. One of their first discoveries was that the supply of books to gratify the spontaneous interests of boys and girls was far too limited in variety and in quality. Progressive publishers responded to appeals for new titles, reprints of older books, translations from other languages, stronger binding and more attractive format. This led to the organization within publishing houses of special departments charged with the making of children's books.

Children's Service Possible Anywhere

Whenever possible, even small libraries set aside pleasant rooms for the exclusive use of children, but there are many small public libraries and branches in which a corner or one end of a room has to serve. After all, the main essentials are good books, understanding librarians, and, of course, the children themselves. If these are present, good work with children can be carried on anywhere.

Service to Young People

In most large libraries and in many smaller ones, young people's librarians are given the responsibility

and a friendly welcome to teen agers is about all that is needed. A small library can have an occasional "high-school" night. The program may be a planned one or it may be entirely informal. If the latter, a record player and a supply of good records are a wise investment.

The Cleveland Public Library created the first separate department for young people when it opened its Robert Louis Stevenson Room in 1925. Other libraries followed. Among the public libraries in which young people's librarians work in adult departments are Denver, Seattle, Portland, and Baltimore.

School Libraries in Modern Education

According to the United States Office of Education reports, there are more than 20,000 centralized school libraries in the United States. In a small school the library may consist of a few shelves of books. In some large schools the library occupies several rooms, includes 10,000 or more books and other materials, has a number of trained librarians, and offers a variety of services. Most school libraries fall somewhere between these two extremes.

Responsibility for the establishment and control of school libraries lies with the school board in some cities and counties and with the public library in others. In still other places school and public library administrators share the responsibility.

A successful school library program requires the coöperation of administrators, teachers, librarians, and pupils. The administrator sees to it that attractive and convenient library quarters are provided, that funds for the purchase of books and other materials are ample, and that pupils have time to use the library. Teachers call upon the library for materials dealing with the units studied in their classes and encourage pupils to go to the school library and to the public library for other materials.

The school librarian of necessity places first emphasis upon the materials and services required by the school curriculum. She works with teachers to train students in the use of reference books and other library tools. But she is also alert to discover the personal interests and problems of boys and girls and to suggest books which fit in with them. In some schools librarians make book talks and conduct story hours. In Sacramento and other cities elementary pupils have free library periods each week, when they look at books and read whatever they like.

Student Assistants

Student assistants play an important part in many school libraries. They charge and shelf books, help prepare new books for circulation, and mount pictures

SCHOOL AND PUBLIC LIBRARY COÖPERATION



A high-school international club is holding a meeting in the Duffield Branch of the Detroit Public Library. Here a member rises to ask a question of the speaker, a foreign correspondent of the *Detroit News*.

ity for working with those readers who are no longer children and not yet adults. Some libraries have special rooms for young people and their books. But some library administrators believe young people's librarians can do the most effective work if located where they meet young people as they enter adult departments. Each plan has special advantages, and the ultimate solution may be a combination of the two.

In town libraries where librarians have the opportunity to know high-school students personally, work with young people is greatly simplified. An alcove with a constantly changing collection of books, a bulletin board for high-school "pictures and news,"

and clippings. Some operate motion-picture projectors and others help arrange exhibits. Thus these students learn about library work and at the same time free the librarian for services that only she can perform. In many schools student assistants are organized into clubs, and in a few states the clubs have formed state associations. The New Jersey School Library Council was the first state organization.

Central School Libraries

The first school libraries were in classrooms. But these classroom libraries were usually so small that bright children soon read everything in them, and books which might have been useful to pupils of another grade remained idle. As schools grew, books were often collected in a central library which served all the classrooms. This proved to be an efficient and economical arrangement. Some school systems now equip classrooms as well as libraries with such basic tools as dictionaries, encyclopedias, and globes. The central library supplies other books.

Central libraries have developed much more rapidly in high schools than in elementary schools. The greatest progress has been made since 1930. The organization of high-school libraries has been stimulated through the requirements of state education departments and regional associations which accredit high schools and colleges. Junior high schools have in general developed libraries adapted from the high-school pattern.

Central libraries in elementary schools are steadily growing in number, the chief advances having been made since 1940. Several state education departments have recently adopted standards for elementary-school libraries. In some twelve-grade schools, where the library was formerly open only to high-school students, elementary pupils are

PUPILS TAKE TURNS AT CHARGING BOOKS



This is the library of the Prospect Elementary School in Pittsburgh, Pa. Pupils learn how books are arranged on the library shelves and how to use the card catalog so they are able to find their own books. They also help the librarian by charging out books, as these two girls are doing.

now provided for. In some elementary schools classroom libraries under the supervision of teachers continue to function.

Rural School Service

County and regional public libraries in some sections have provided library service to schools for years. Recently county boards of education in scattered counties throughout the United States have established various types of county school library centers or materials bureaus, as they are sometimes called. California, Virginia, and Louisiana are among the states which have developed such centers.

In California, the San Diego County School Library Service Center, which began operation July 1, 1947, has a stock of more than 105,000 volumes. Weekly deliveries are made by truck to nearly 80 elementary

“AVIATION DAY” IN NEWARK, N. J.



The Southside High School Library's exhibit of books and magazines on aviation attracted both boys and girls. Nowadays girls are as interested in flying as boys are. It is quite possible that some of these high-school girls may later take lessons in flying.

schools which have contracted for this service. Books may be exchanged at any time. The center offers consultant library service to all county schools.

Steps in Progress

Before 1900 there was much discussion of the need for school libraries and a few were established. But the modern central school library is a development of the 20th century. In September 1900, a library school graduate was first employed in a school library. She was Mary A. Kingsbury, who was appointed librarian of Erasmus Hall High School (New York City). In 1903 Mary E. Hall, who had also taken the course for children's librarians at Pratt In-

DELIVERY SERVICE IN SAN DIEGO COUNTY



About 80 elementary schools in San Diego County, Calif., receive books once a week from the library in the County Schools Service Center. Both teachers and pupils ask for the books they want.

stitute, became librarian at Girls High School (New York City). These and other pioneer school librarians, who first adapted public library methods and procedures to the needs of schools, laid the foundation for modern school libraries.

In 1915 a school library section of the American Library Association was organized. In 1918 the National Education Association set up the first standards for high-school libraries, which were approved two years later by the American Library Association. Present standards for elementary- and high-school libraries, adopted by the American Library Association in 1944, were prepared by its American Association of School Librarians. These standards call for an annual appropriation of \$1.50 for each pupil for books and other printed materials and recommend a minimum appropriation of \$300 annually for schools having less than 200 pupils. Although the average school library does not as yet meet this standard, book appropriations average higher each year and school libraries in some places spend more than this amount.

Extension Agencies, School Supervisors, and State Libraries

LIBRARIANS in each state realize what their extension agency has accomplished to further the library development of that state. But the public knows little of what state library extension workers have done as a group to develop plans for rural service and to carry them through. There would be few regional and county libraries in the United States if it had not been for these librarians who have fought for legislation and appropriations. They have enlisted the help of state organizations, have tested all types of rural library services, and have given them such publicity that people have seen their value and have extended them.

While all the 48 states have laws providing for state library extension agencies, strong departments have not yet been organized in all of them. In some states these extension agencies are independent departments which are often called library commissions. In other states they are divisions of departments, such as the Department of Education, the State Library, or the Department of State.

The advance of school libraries is in large part due to the work of school library supervisors who function in states, counties, and cities. About half the states employ school library supervisors. Usually this supervisor works in the Department of Education. In some states the school library supervisor is a staff member of the library extension agency. In many states money is appropriated for the purchase of books and other materials needed by the schools. This is known as state aid.

About half of the states have laws requiring certification of librarians in certain types of public libraries. About three fourths of the state education departments have certification requirements for school librarians.

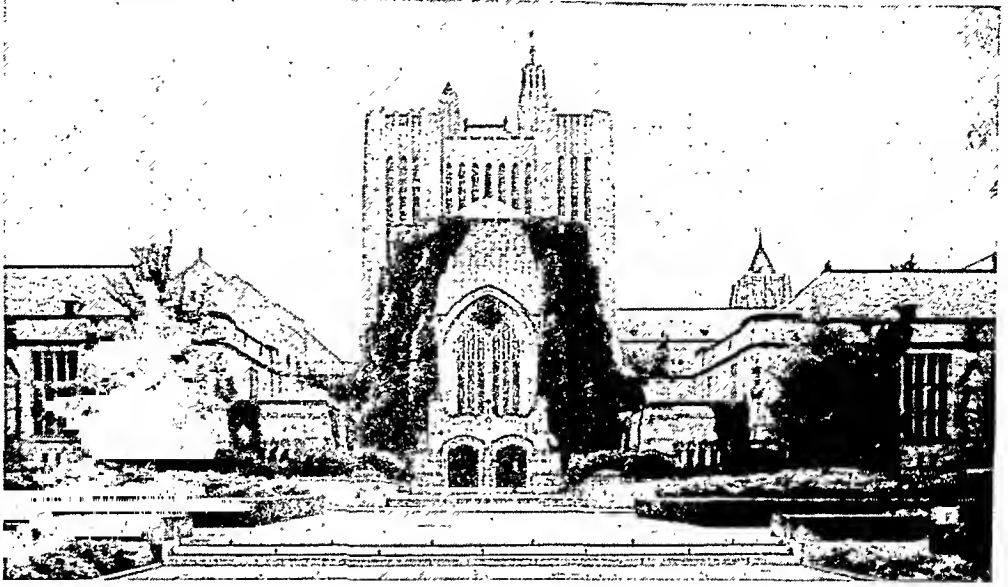
Among the first libraries in states were those designed for the preservation of state documents, records, and other material connected with state history. It is well that so much of this material has been preserved, for such libraries provide most of the material used by regional and local historians and other writers. Law libraries are essential in all states as is special library service to legislators.

College and University Libraries—Other Great Research Libraries

MANY of the large public and university libraries of the United States are rich in research facilities. There are also a number of great research libraries which are famous for collections in special fields.

"The true university of these days is a collection of books," said Carlyle. One of the most significant yardsticks for rating a college or university is the quality and size of its library. The approximately 1,700 colleges and universities of the United States today have well over 90 million volumes.

THE STERLING MEMORIAL LIBRARY AT YALE



This library, a gift of the John W. Sterling Estate, was dedicated in 1931. It contains more than 2 million volumes and is one of several large libraries at Yale University.

Harvard University library, with over 5 million books and pamphlets, is the oldest library in the country. It was created in 1638 when John Harvard gave his books to the university, which had been founded in 1636. William and Mary College (1693) had a library from the beginning, as did Yale University (1701).

The Folger Shakespeare Library in Washington, D. C., has the greatest collection of printed books in the Western Hemisphere for the study of English civilization between 1476 and 1640. It has the world's greatest collection of books by and about Shakespeare. In all, the library contains about 150,000 books and 50,000 manuscripts. Other rare items include paintings, playbills, photographs, and stage properties (see Shakespeare).

The Henry E. Huntington Library in San Marino, Calif., which was opened in 1920, is especially famous for its materials on the history and literature of North America and the British Isles. The library contains a valuable Shakespearean collection and such interesting items as the manuscript of Benjamin Franklin's 'Autobiography' and manuscripts of poems by Burns, Poe, and Kipling.

Chicago has two famous research libraries. The John Crerar Library (1894) specializes in technology and natural sciences. The Newberry Library (1887) specializes in literature, religion, philosophy, philology, fine arts, and typography. In 1911 it acquired the large Edward E. Ayer collection which deals chiefly with the American Indian.

The Pierpont Morgan Library in New York City (1924) is

notable for its medieval illuminated manuscripts, rare bindings, and first editions.

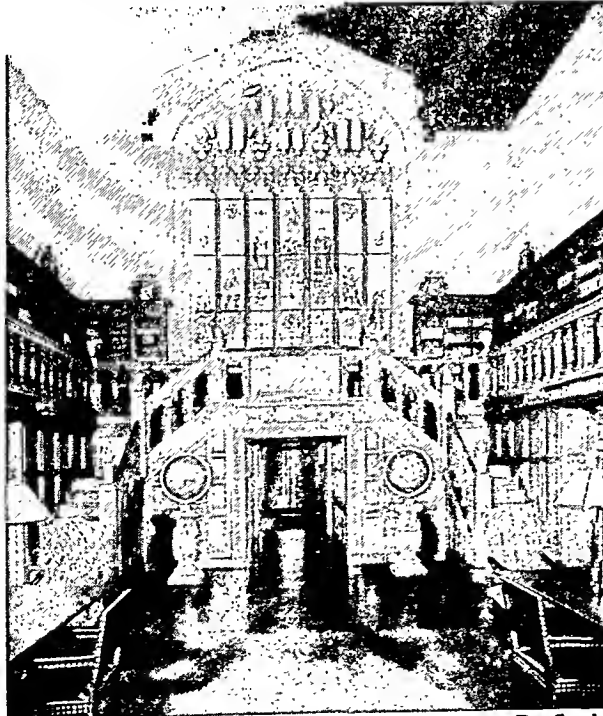
United States Government Libraries

ONE OF the greatest of national libraries is the Library of Congress at Washington, D. C., which was established in 1800. The original building was burned in 1814 when British soldiers occupied the capital. The library was re-established with the purchase, in 1815, of Thomas Jefferson's library.

The main building was erected in 1897 and the magnificent new annex in 1938. The Library of Congress contains more than 9 million books and pamphlets, and nearly 13 million manuscripts. This library is especially strong in United States and Hispano-American history, music, and aeronautics. The law library alone has more than a half-million volumes.

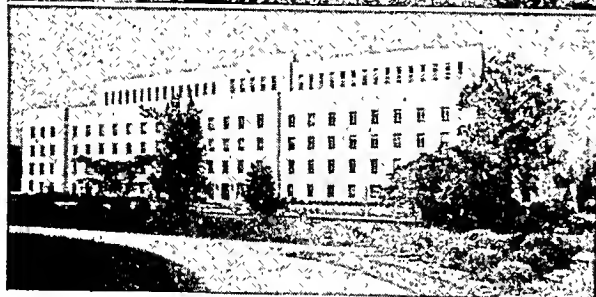
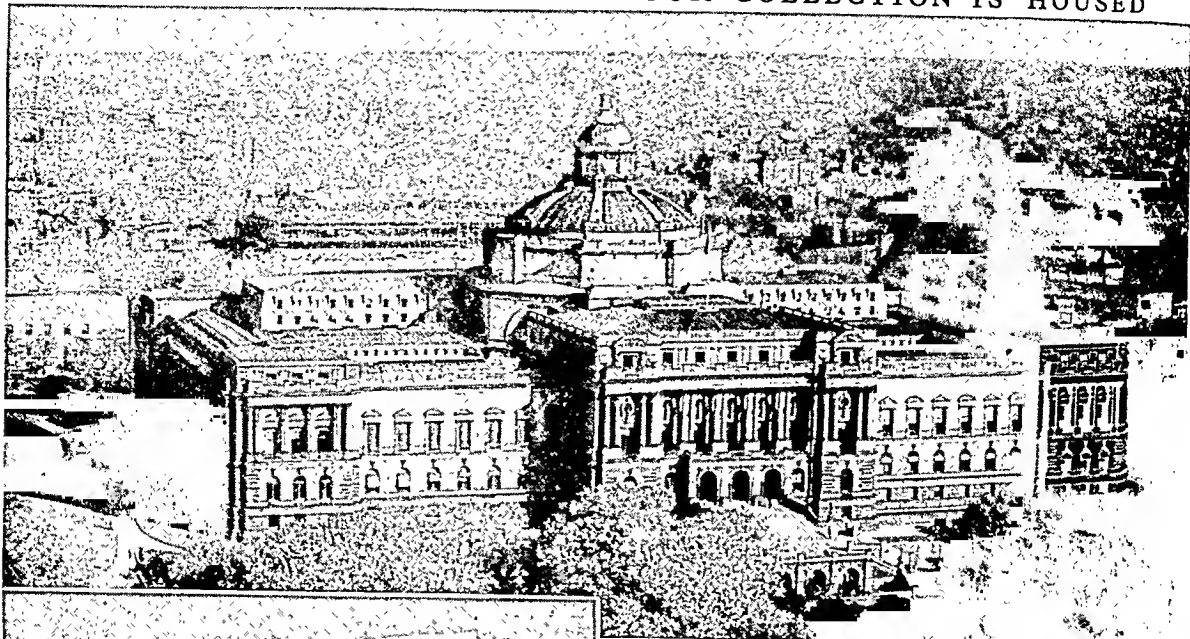
To serve the blind, the Library of Congress has a large collection of embossed books and phonograph book records. These are loaned through its own services and through certain state and public libraries. They are carried post free by the post office. Since 1870 the registration of copyrights has been under the librarian of Congress. The register of copyrights receives copies of all publications copyrighted in the United States.

INSIDE THE FOLGER LIBRARY



The Folger Shakespeare Library in Washington, D. C., is housed in a beautiful classic building. This is an interior view showing the "Window of the Seven Ages of Man."

WHERE AMERICA'S GREATEST BOOK COLLECTION IS HOUSED



The Library of Congress in Washington, D. C., occupies two buildings opposite the Capitol: (top) the main building, completed in 1897; and (bottom) the annex, completed in 1938.

Located in the Library of Congress is the United States Book Exchange, Inc., which serves as a center for the collection and exchange of research materials among libraries in many parts of the world. It began operation in 1949. Participating libraries pay a service charge. At the outset, the work was aided by a grant from the Rockefeller Foundation.

Government records are housed in the stately National Archives Building, completed in 1937. Among the most important departmental libraries are those of the Department of Agriculture and the Department of Health, Education, and Welfare. The library of the Office of Education is consolidated with the latter.

Library Service for the Armed Forces

The United States Navy has an extensive library program. General libraries for ships and shore stations in the United States and overseas are directed by the Library Services Section of the Bureau of Naval Personnel of the Department of the Navy. Trained librarians are in charge of libraries at major shore stations and hospitals. Each ship and station has its own book collection, for which new titles are supplied regularly. There are also many specialized reference libraries connected with the Navy Department and its research activities.

During World War II a wide network of army libraries was developed. Afterward it was continued for the peacetime army. These libraries are administered by librarians at all main headquarters and in camp and hospital libraries in the United States and overseas. Bookmobiles, traveling libraries, and deposit collections are used to reach those men who do not have access to libraries. Current books are supplied to libraries in army commands both overseas and in the United States.

Technical, legal, educational, and recreational reading materials are supplied to United States Air Force personnel throughout the world by a system of base libraries, branches, and field collections. This library service is directed from Air Force headquarters in Washington. Air Command librarians are stationed at major headquarters. All trained librarians in this branch of the armed services are civilians.

Information Libraries Abroad

As a part of its program of information and education, the government of the United States maintains libraries and reading rooms in many foreign cities. These libraries are administered by trained American and local librarians. Their collections include books, magazines, films, records, and other materials giving information about the United States and the American way of life.

While all these information libraries are open to the general public, a primary purpose is to reach leaders in the countries where they are located. Among the users are government officials, educators, newspapermen, and others who influence public opinion. Other important patrons of these libraries are university students, the potential leaders of the future. In most of these libraries there are good collections of children's books. These attract the attention of young and old in story hours and other

programs for children, and teachers are encouraged to bring their classes to the library.

Librarianship as a Vocation— Organizations and Periodicals

LIBRARIANSHIP is one of the few uncrowded professions. A great demand for trained librarians has resulted from the increase in the number of county and school libraries. Special libraries and public libraries are constantly advertising for more trained librarians.

The young person who is interested in entering the library field should find out what schools are accredited by the Board of Education for Librarianship of the American Library Association, since these schools give the necessary preparation for work anywhere. In addition to these accredited schools, other colleges offer library science courses which equip students for positions in the states and cities in which they are located. Information concerning library schools and required preliminary courses may be obtained from directors of library schools, state library agencies, local libraries, or from the American Library Association, 50 East Huron Street, Chicago.

Most accredited library schools in colleges and universities give a year or more of specialized training. For admission they usually require four years of college work. In a few of these colleges, library science is a part of the undergraduate program. Since 1947 a number of the major schools of library science have reorganized their courses of study and now award a master's degree upon the completion of one year's graduate work. Some library schools continue to give an additional bachelor's degree for a year's work in library science following graduation from college. A few universities offer courses in library science leading to a doctor's degree.

Library Associations

The American Library Association, the oldest and largest library association in the world, is largely responsible for the high professional standards which now prevail in libraries. Today more than 19,000 members of the Association represent libraries of all types in the United States and Canada and include library representatives from many countries abroad. Headquarters, with a permanent staff, are maintained in Chicago.

The Special Libraries Association was founded in 1909 to develop the usefulness of libraries serving business firms, banks, newspapers, scientific organizations, museums, and similar groups and institutions in the United States and Canada.

The Catholic Library Association was organized in 1921 as a section of the National Catholic Education Association and was reorganized as an independent association in 1931. Its work is largely directed toward the development and improvement of libraries in Catholic schools.

In addition to the associations already named, there are more than a dozen national organizations and more than a hundred state and regional organizations of librarians, library trustees, and other citizens.

Library Periodicals

The oldest national library periodical in the United States and Canada is the *Library Journal*, founded in 1876. Publications of the American Library Association include the *Booklist*, a guide to new books; the *A.L.A. Bulletin*; *College and Research Libraries*; *Hospital Book Guide*; and the *Subscription Books Bulletin*. Other national periodicals include the *Catholic Library World*; *Library Quarterly*; *Special Libraries*; and the *Wilson Library Bulletin*. The Canadian Library Association issues a bulletin. State and regional organizations and some larger libraries publish bulletins and newsletters.

Libraries in Canada

CANADA is making considerable progress in providing good library service for its people. It is a nation of vast areas. Its population is about equal to that of the state of New York, but its millions of people occupy an area which extends clear across the North American continent from the Atlantic to the Pacific Ocean. In

the six large provinces which include the greater part of Canada, the population is concentrated along the southern border. But each of these provinces has thinly populated areas that stretch far to the north.

Much of Canada's population lives in rural areas. More than half of the people live in the country or in towns of less than 5,000 inhabitants. So Canada's greatest library problem is service for rural people. Many of these live in sections where the winters are severe and roads are often closed.

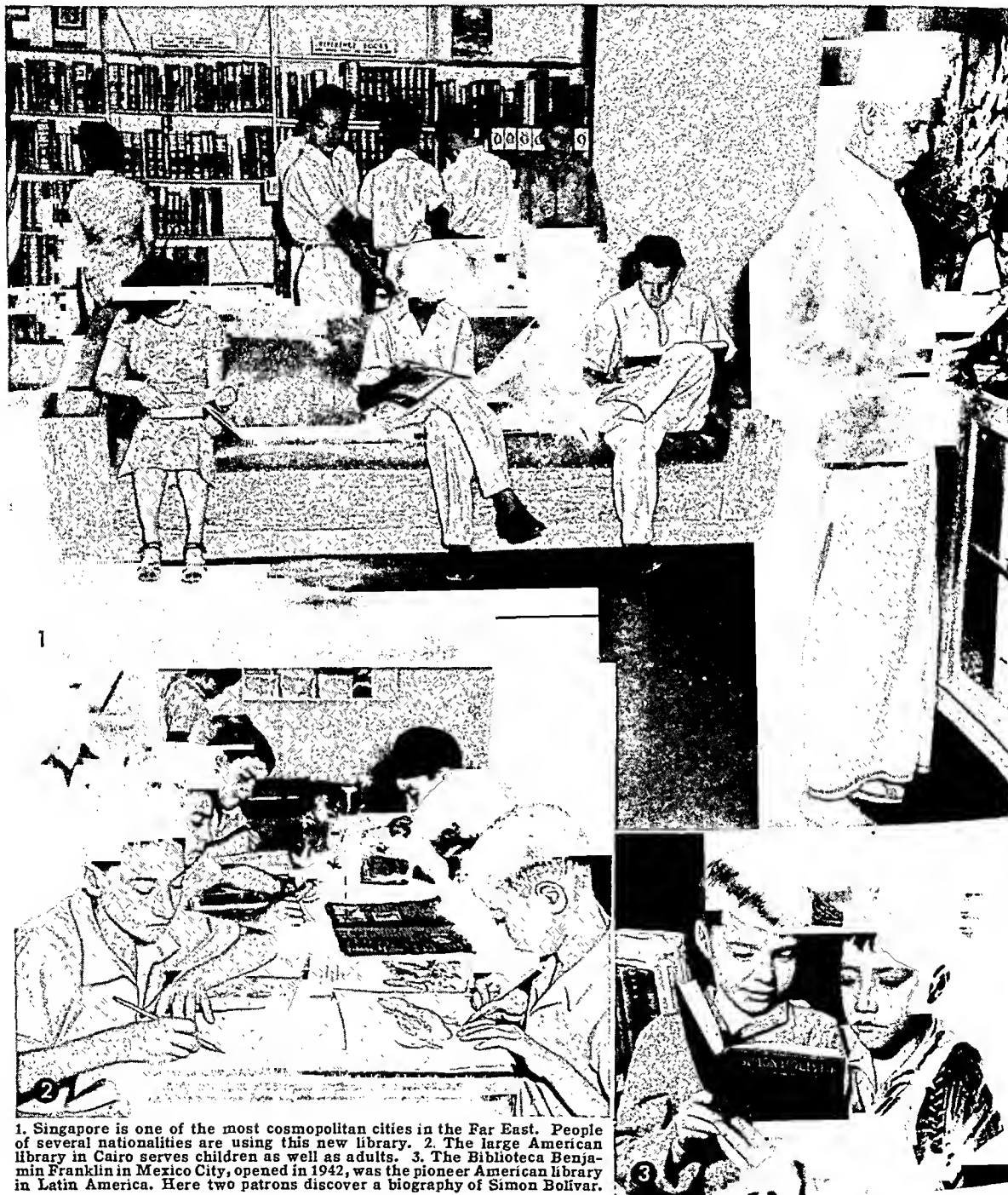
In nine out of the ten provinces in Canada, English is the principal language which people speak and read. But in the province of Quebec, where more than a fourth of the people in Canada live, most people speak French. Although they are French-speaking, the people of Quebec are definitely Canadian in their thinking. They have no special bond with France except a common language and some social customs which they have retained.

BOOKS FOR THE NAVY—A SCENE ON A WARSHIP



A system of ship libraries provides books for United States sailors. These men are reading in a casemate of a ship.

UNITED STATES INFORMATION LIBRARIES ABROAD



1. Singapore is one of the most cosmopolitan cities in the Far East. People of several nationalities are using this new library. 2. The large American library in Cairo serves children as well as adults. 3. The Biblioteca Benjamin Franklin in Mexico City, opened in 1942, was the pioneer American library in Latin America. Here two patrons discover a biography of Simon Bolivar.

Few modern books published in France fit Canadian interests and needs. And since Quebec's population is about that of Chicago, the book market is not sufficient to support any large local publishing industry. Popular books published in France and Quebec are usually paper-bound and have to be rebound in cloth for library use, which is expensive. Thus, Quebec has a book supply problem which directly affects its libraries and does not exist in other Canadian provinces.

Montreal is gradually developing a public library system and is building up its public school libraries. About one-fourth of the people in the city are English-speaking and libraries have books in both French and English. Westmount, an independent municipality of English-speaking people within Montreal, has an excellent public library and good school libraries. There is some library development in other towns in this urban region. Outside this area, there is only one

city in Quebec, Trois-Rivières, that has a free public library with adequate tax support. Universities in the province have good libraries and there are numerous society libraries, especially in the city of Quebec and in the Montreal area.

Public Libraries

Libraries in most of the larger Canadian cities are much like those of the United States. They are divided into departments and operate systems of branches. Libraries in most of the larger towns compare favorably with those in the United States.

In Ontario a county library is called a county library coöperative, and a number have been organized in the province. In each coöperative there is a headquarters library which provides reference service and lends books to rural schools and organized groups such as farm forums. Small libraries within the county buy books coöperatively and exchange them at intervals. So they have access to more books than they could buy individually and have the help of a trained county librarian. These library coöperatives are supported by county and provincial grants and by fees from member libraries. The general pattern for a library coöperative is set out in the Ontario Public Libraries Act as amended in 1947.

In British Columbia, the Maritime provinces, and some other parts of Canada, regional library systems similar to those in the United States have made considerable progress in recent years. One of the first of these was established in 1929 in the Lower Fraser Valley of British Columbia. This library was estab-

lished by a grant from the Carnegie Corporation but has been supported by taxes since 1934. Similar regional libraries are in the Okanagan Valley and on Vancouver Island.

In 1933 a regional library for Prince Edward Island was established with the aid of a grant of money from the Carnegie Corporation. Since 1936 the library has been supported by the people.

Nova Scotia's first regional library system was opened in 1949 to serve the Annapolis Valley. Plans for the development of regional libraries throughout Nova Scotia were made after a provincial library survey in 1937. The Carnegie Corporation gave a \$50,000 grant to aid this development. Work was suspended during the second World War but is now being pushed vigorously. Halifax is the only city in Nova Scotia large enough to maintain an independent city library.

In Newfoundland, libraries operate on a regional plan under a provincial Public Libraries Board. The Gosling Memorial Library in the city of St. John's serves as a reference center and its books are available to all the people of the province. There are 25 libraries serving as regional centers. This regional system is supported by provincial grants and local funds.

The first regional library in the prairie provinces was established in 1950 in the Prince Albert district of Saskatchewan.

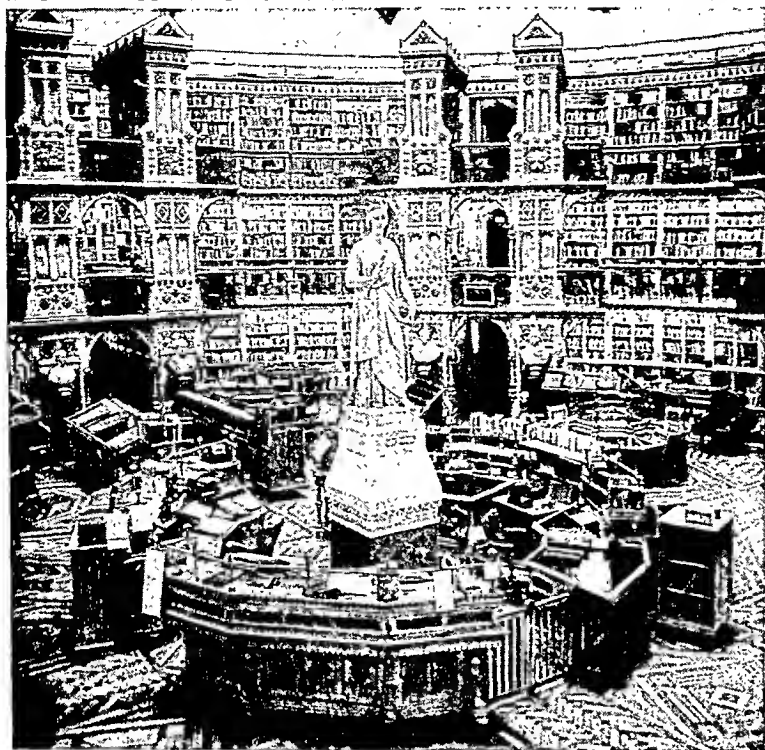
Most of the provinces in Canada have some kind of provincial extension agency which works to further rural library service. Some of these agencies employ

THE STORY HOUR HOLDS CHILDREN SPELLBOUND



This striking photograph was taken in the Public Library and Art Museum of London, Ontario. Storytelling for children is featured in this library as it is in the public libraries of Toronto and other cities in Canada.

THREE STORIES OF BOOKS—THE LIBRARY OF PARLIAMENT



The Library of Parliament in Ottawa (Canada) is housed in a building of Gothic design. It stands on a hill behind the Houses of Parliament and is the only building which remained after the disastrous fire of 1916.

field workers and have greatly influenced library development in their provinces. Others are small departments which are merely book-lending agencies.

University and School Libraries

Canada has about 170 libraries in universities, colleges, and normal schools, with nearly 6 million volumes in all. The largest English-language libraries are those of McGill University at Montreal (1821) and the University of Toronto (1827). The largest of the French-language university libraries is that of Laval University in Quebec City (1852). Most of the provincial universities in the western provinces have fine libraries, that of British Columbia (1915) being the largest.

School libraries are an important part of Canada's educational system. As early as 1850 Ontario had school libraries, and this province is especially progressive in its school library policies. Most provinces make grants of money to provide library books for schools. Many

school librarians have had training, and most of the large high schools provide good library quarters and equipment. Saskatchewan has a provincial school library supervisor in its department of education.

Government and Special Libraries

The Library of Parliament in Ottawa has more than 500,000 volumes for the use of members of parliament. Many government departments have good collections of books, among them the National Research Council, the Geological Survey, and the Department of Agriculture. Altogether the government operates some 30 separate libraries in Ottawa. The Canadian National Institute for the Blind circulates phonograph book records and embossed books from its office in Toronto.

In 1946 the Canadian Library Association was organized with headquarters in Ottawa, the capital of Canada. In 1947 the Association took the lead in a campaign for a national library, and in 1952 the Canadian Parliament passed a bill establishing the National Library of Canada in Ottawa.

Library school courses leading to the degree of bachelor of library science may be taken at McGill University, the University of Toronto, and the University of Ottawa. The first two are accredited by the American Library Association. Courses for the degree of master of library science were first offered in 1950-51 by the University of Toronto and the University of Ottawa. Fairly extensive courses in library science are also given at the

A NEW KIND OF DEMONSTRATION LIBRARY



Students at Moose Jaw Normal School in Saskatchewan set up this tiny library in a corner of a classroom to show that even a small rural school with little money and space can provide quarters for a library. The students themselves built some of the furniture.

University of Montreal and Mount St. Vincent College, Halifax, Nova Scotia. Short courses for librarians of small libraries are offered by the Public Libraries Branch of the Ontario Department of Education.

Latin American Libraries

WE USE the term Latin America so loosely that one might get the impression that Mexico and the

19 countries of the West Indies and of Central and South America are as much alike as the 48 states of the Union. Nothing could be more misleading, as the reading of the articles on these countries in this encyclopedia will show. Consider, for example, the neighboring countries of Brazil and Uruguay. Brazil is larger in area than the United States. It has huge plains and tropical jungles. Its cities are concentrated in the highlands on the southeastern coast. The population of Brazil is more than 52 million. About half the people are white; the rest are mostly mixed white and Negro. Only about 25 per cent can read and write. The language is Portuguese.

Uruguay, on the other hand, is only a little larger than New England, so its population is concentrated in a fairly small area. Most of its 2,300,000 people are white and of European descent. Eighty per cent are classed as literate. The language is Spanish.

Looking at these two countries from the standpoint of libraries it would seem quite possible to develop a good modern library system in Uruguay, but who could prophesy anything for Brazil beyond the small area to the southeast? For in that vast country the problem of giving children even the rudiments of an education is so great as to be almost insoluble.

The only way to learn about Latin American libraries is to study the library situation in each country against the background of that country. In this brief space we shall attempt little more than to make those few generalizations that are possible and to touch on some recent developments.

Few Latin American cities have public libraries as we know them. The best system is in São Paulo, Brazil. This city has a population of more than 2 million and is the largest coffee market in the world. The central library is a large modernistic building, and there are children's branches through which a vigorous program of work with children has been developed. La Paz, the largest city in Bolivia, has a public library system. In Montevideo, Uruguay, there are some 17 libraries in the various

wards in the city, which are administered by the Municipal Cultural Commission.

National and University Libraries

National libraries were organized after 1825 as Latin American countries one by one achieved independence. Some of these national libraries were originally public libraries, and today some national libraries lend books to people in the capital cities where they are located. A few extend book service to sections outside the capitals, and some are taking the lead in national programs for library development.

The rare book and manuscript collections in these libraries are of inestimable value because they contain so much information on the early exploration and

colonization of the Western Hemisphere. Much of this material pertains to the southern part of the United States. Many items have not been available to historians because they were not cataloged and were often inaccessible. Now that they are being organized, the help that librarians of the United States have given will be repaid by the enrichment of their early history.

In most Latin American universities the various departments have built up their own libraries. Some universities are now developing central catalogs for these libraries so that faculty and students may know what books are owned and where they are. In some universities there is a start toward a central reference and circulation service.

Problem of Book Supply

In order to analyze the future of popular libraries in any country, one has to know the book-publishing situation. Outside of Argentina, Brazil, Chile, and Mexico there are comparatively few publishing houses in Latin America. Some countries have none. Argentina is a center for the publication of books in Spanish and exports them to other countries. Brazil, the only Portuguese-speaking country in Latin America, has to publish most of its own books. The textbook shortage in most Latin American countries is an index to the whole book situation. Since few children have individual textbooks, a teacher usually reads aloud or dictates from memory, and the children take notes. Recently the Institute of Inter-American Affairs and the ministers of education in several Latin American countries prepared a few attractive readers for lower grades. These are offered as samples which may lead to the publication of similar textbooks.

Looking to the Future

As one surveys libraries in the different countries of Latin America, there seems to be no indication

WHERE RARE BOOKS ARE COMMON



Latin American national and university libraries are famous for their collections of rare old books and manuscripts. Here are a few of those in the University of Quito in Ecuador.

that a clear pattern for the future is emerging anywhere. Mexico and a few other countries are doing considerable planning on the government level. Mexico has created central departments for public libraries and for university libraries. Its Department of Education is responsible for school libraries. Uruguay and Argentina probably have the best libraries in elementary schools. Panama is working to provide general library service by creating library districts where

people will be served through branches of the national library. Mexico and Colombia have devoted more attention to rural library service than the other Latin American countries. Service to children is increasing in many public libraries.

Looking to the future, it may be to the advantage of most Latin American countries that they are not yet wedded to any library pattern, for in the United States it has been proved that it is slow, uphill work to establish library service for all the people where, for a hundred years, people have thought mostly in terms of libraries in cities and large towns.

The future of public and school libraries in most Latin American countries may depend largely on what results from the professional training of those librarians who during the past few decades have been attending North American library schools or are now

A DRAWING LESSON IN MONTEVIDEO, URUGUAY



This children's library was named for Maria Stagnero de Munar, the first woman teacher in Montevideo. It is located in Rodo Park and is operated by the Municipal Cultural Commission.

studying in library schools in Latin America. Among those countries with schools giving a year's work in library science are Brazil, Uruguay, Argentina, Peru, Mexico, Cuba, Chile, and Panama. A number of countries have library associations. There have been meetings where librarians of many Latin American countries have assembled.

How the First Libraries Started

The first known libraries in Latin America were founded in monasteries

and in universities, with books brought over by the Spanish conquerors and priests. The oldest existing library is at the University of San Marcos in Lima, Peru. Founded in 1551, it was probably the first library in the Western Hemisphere. Other university libraries established during the colonial period include those of the University of Mexico and the National University of Córdoba in Argentina.

Prior to the arrival of the Spaniards, the Aztecs and the Mayas may have had collections of manuscripts. We know that they produced paper and developed a system of hieroglyphic writing. Bernal Diaz del Castillo, who was with Cortez in the conquest of Mexico, mentioned a number of manuscripts seen in the village of Texcoco near Mexico City; and Bishop Landa in 1569 wrote of the burning of a number of Mayan manuscripts in Yucatan.

How to Use a Library

THE BEST library in the world would be useless without careful organization. Books must be so arranged, marked, and cataloged that any book in the collection can be produced on a few minutes' notice.

Most public and school libraries in the United States and Canada arrange their books according to subject. Several classification systems are used to accomplish this purpose. Great universities and special libraries often use the Library of Congress classification. The Dewey Decimal classification is used by most public libraries and by virtually all school libraries. Melvil Dewey devised this scheme in 1876, and it has been kept up to date by his successors.

The Dewey Decimal Classification System

The Dewey Decimal classification divides books into ten main subject classes. Each class has many subdivisions. The main classes and a few of the important subjects covered in each are as follows:

000-099 General (encyclopedias, reading lists, newspapers, magazines)
100-199 Philosophy (psychology, ethics)

200-299 Religion (Bible, myths)
300-399 Social Sciences (sociology, economics, political science, etiquette)
400-499 Grammar and Languages (dictionaries)
500-599 Science (mathematics, astronomy, chemistry, birds)
600-699 Useful Arts (agriculture, aeronautics, radio)
700-799 Fine Arts (photography, painting, music)
800-899 Literature (stories, poems, essays)
900-999 History (travel, biography)

Each of these main classes is divided into ten main subdivisions. These subdivisions are further divided through the use of decimals so that books on a special phase of any subject may stand together on the shelves. This is made clear by the following table showing subdivisions of the classification number 500, with further subdivisions of the section 598:

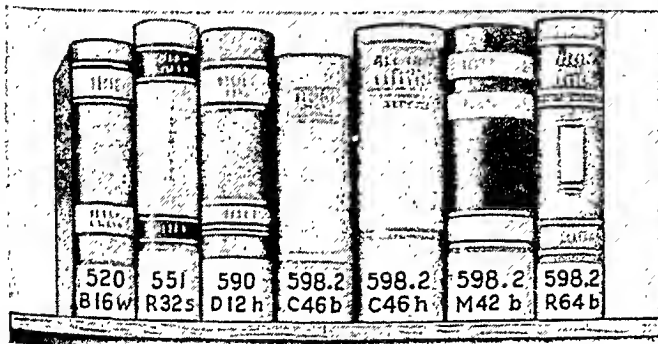
500 Science in general
510 Mathematics
520 Astronomy
530 Physics
540 Chemistry
550 Geology
560 Paleontology

570 Biology
580 Botany
590 Zoology
598 Reptiles and Birds
598.1 Reptiles
598.2 Birds
599 Mammals

HOW TO FIND BOOKS IN A LIBRARY



Young readers find their favorite books on the shelves of the Skinner Room in the St. Paul Public Library, which is set aside for the use of older boys and girls.



Books are placed on library shelves according to call number. The drawing above shows a group of books arranged for return to the library shelves. The first book is 'When the Stars Come Out', by R. H. Baker. The number 520 shows that the book is about astronomy. B 16 is the author number, which the librarian takes from a library aid known as the Cutter order table. The letter W is the first letter in the title of the book. Some libraries use only the initial of the author instead of the more elaborate combination of letters and numbers.



520 Baker, Robert Horace.
B16w When the stars come out. Viking, c1934.

520 When the stars come out.
B16w Baker, Robert Horace.

520 ASTRONOMY
B16w Baker, Robert Horace.
When the stars come out. Viking, c1934.

AUTHOR
CARD

TITLE CARD
SUBJECT CARD

The card catalog (above) is arranged alphabetically in drawers. Guide letters on the outside of each drawer show what part of the alphabet it contains.

Three catalog cards have been made for this book on astronomy so that the student may find it under author, title, or subject. If he should look under the heading "Stars" he would find a card referring him to the heading "Astronomy." It is interesting to note that librarians do not follow the usual custom of capitalizing all words in a title but use small letters for all words in the title except the first word and proper names.

A *classification number* is stamped on the back of each book. A book on birds, for example, will carry the number 598.2. Since books within the same class are arranged on the shelves by author, a symbol is often used to indicate the author. The classification number and the author symbol make up what is known as the *call number*.

The Card Catalog, Key to the Library

A card catalog does for a library what an index does for a book. It tells readers what books are in the library and where they may be found. With the aid of this catalog a reader can locate any book in the library if he knows its author, title, or subject. The *author* card in the catalog gives the name of the writer of a book on the first line, and the title on the second. The *title* card gives the name of the book on the first line and the author's name on the second. The *subject* card notes the subject of a book on the first line, followed by the author and title on the second and third lines. All cards are arranged alphabetically in cabinets according to the entry on the first line.

The shelf location of a book is found through the call number, which is usually placed on the upper left-hand corner of each card. This call number is also stamped on the back of the book. Fiction often has no call number, being arranged on the shelves alphabetically by author. For non-fiction, the top figures of the call number show the class in which a book may be found; the lower numbers represent the author and sometimes the title. The student who looks in the catalog for George Bird Grinnell's 'The Story of the Indian' would find the classification number 970.1 in the upper left-hand corner of the card. Below this class number would appear the author number, G86s. Many libraries have given up the use of an author number and use only the initial G below the classification number. For individual biography, many libraries use the letter B instead of the Dewey decimal classification number 921. The initial letter of the name of the person about whom the book is written appears below the letter B. A book about Abraham Lincoln, for example, would be marked B with an L below, and it would be found on the biography shelves among the lives of people whose names begin with L.

The amount of information given on a catalog card varies according to the kind of library. Most small libraries use a very simple card, like those illustrated on the preceding page. Many libraries add other information, such as the size and the number of pages.

Sometimes a catalog card tells a reader who looks for books on a certain subject that he will find them under another heading. For example, if he is looking under Airdromes, he will probably find a "cross reference" card with the words "See Airports." Other cards are used to send him from a general subject to a specific subject. If a student is looking under the heading Birds for a special book on Pigeons, he will probably find a card which says "See also Pigeons."

In a small library a reader may go directly to the shelves for the book which he wants. In large systems, book stacks are usually not open to the public and

an assistant finds the books which are requested. The student consults the card catalog and writes on a slip the call number as well as the author and title of the books which he needs.

Other Aids for the Reader

Every library has indexes and other aids which help a reader to find information easily. For magazines, the most valuable aid is the *Readers' Guide to Periodical Literature*, which indexes the contents of general magazines since 1900. Libraries which have large collections of magazines usually have special periodical indexes which are of great value to businessmen, research workers, teachers, and others. For books, there are systematic book lists on all subjects; these are called "bibliographies" (see Bibliography).

To provide readers with the latest facts and figures on many subjects, most libraries have what they call "vertical files" of pamphlets and clippings, and files of pictures. From these one may get basketball rules, suggestions for making Christmas cards, pictures of flowers, and many other kinds of information.

In most school libraries today, young people learn how to use fact-finding books such as dictionaries, encyclopedias, atlases, and almanacs, which will be helpful to them all their lives. Librarians willingly show readers how to use these important reference books.

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Seven Stories High — The Child's Own Library

CHILDREN should grow up with books of their own. Books wisely chosen to widen the world and feed the natural interests of childhood are not luxuries. They are as essential to mental and spiritual growth as right foods for the body, and some provision for their purchase should be in every household budget. Starting a children's library in the home is a responsibility that the father should share equally with the mother. It gives both an opportunity to rebuild their own ideas of what the world is like in terms of the childhood of another generation.

No search upon which parents may embark yields greater treasure than the search for the beginnings of art, literature, science, and human history as revealed in children's books. A child's book at its best is a work of art designed by its creator, whether writer or artist, to give pure joy to children. Only a few books achieve this high purpose, and the period for the keenest appreciation of them is so short that, in the list which accompanies this article, special attention is directed to books for children under seven. Tastes in subject matter vary with the individual child; but by continuous exposure to good drawing and purity of conception a lasting and discriminating taste for art in all forms may be cultivated.

The picture books of Randolph Caldecott, for example, contain the most spirited drawings of dogs

and horses, cocks and hens, pigs and cows, to be found among books for little children. They also form for those who are older a unique pictorial record of 18th-century England. Caldecott was a master of line drawing with a genius for graphic, genial presentation of life. "What Caldecott set forth," says Arthur Rackham, "seems to me quite as important as what Dickens and Victor Hugo had to say. The milk of human kindness was in the man. There is no unkindliness in his fun."



'Ride a Cock Horse to Banbury Cross', pictured by the English artist Randolph Caldecott, in his 'Pamandrum Picture Book'. (Warne.)

Caldecott's picture books are never forgotten or outgrown by those who have known them in childhood, and 'The Farmer's Boy' may well form the cornerstone of a child's own library, to be followed by other titles in board covers. They may later be renewed in more permanent bindings as the child comes to see their relation to the social history of England and to the art of illustration. Boys are interested to know that Richard F. Outcault, the American cartoonist, derived his inspiration for Tige, Buster Brown's dog, from 'The Mad Dog' pictured by Caldecott. Outcault was of the opinion that these picture books would outlast all others. It was his lasting regret, as of many others, that Caldecott did not illustrate a complete 'Mother Goose.' His treatment of 'Ride a Cock Horse' shows how well he could have done it.



Fanchon, seen feeding the birds here, is a little girl whose daily life is told and pictured in Anatole France's 'Nos Enfants' ('Our Children: Scenes from the Country and Town'), illustrated by Boutet de Monvel.

Many artists have made pictures for 'Mother Goose', but none has yet done them supremely and for all time. Walter Crane, in 'The Baby's Opera', set forth a number of old rhymes with music by the earliest masters. This unique picture song-book and 'Vieilles Chansons', the traditional French folk-songs illustrated by Boutet de Monvel, are ideal introductions to music and to artists whose influence is incalculable in the building of a child's own library. True pictures of animal life against a background of the English lake country are to be found in Beatrix Potter's 'Peter Rabbit' and her other little books. True feeling for childhood, for gardens, and for the ways of little children springs perennially from Kate Greenaway's 'The Marigold Garden' and 'A Apple Pie'. Kate Greenaway was a friend of Randolph Caldecott and their birthdays fall within the same week of early spring. Children enjoy and remember the association of the gift of certain books with the birthdays of artists such as these.

Let Books be Joyful Gifts

Making an event, a festive occasion, of the gift of a book to the child's own library is a tradition in many families. It should bring the joy of a welcome visitor, and it will, if the book has been chosen with the child's taste at the moment clearly in mind. And since new tastes spring up from week to week, from month to month, from year to year, parents cannot afford to let slip any opportunity to share the reading interests of their children. In this way only is it possible to relate books to life in the two worlds every child must rediscover for himself—the world of the imagination and the great world without.

The world that children live in today has changed remarkably in a generation; yet childhood itself remains unchanged in fundamental characteristics. Children demand, first of all, sheer enjoyment from their books. They are naturally intensely interested in what they see going on about them, but the transfer of that interest to its mere reflection in a book at once suggests the immediately useful—the roughage rather than the vitamins of the arts. If the world is to mean very much, the imagination must be chiefly fed the food on which it thrives—good drawing, fine music, genuine nonsense, lyric poetry, wonder stories, and heroic tales in memorable language.

To the young child the wide world is not too big nor too far away to wonder about and explore, and so a large map of the world should be one of the first purchases for the children's library. Unburdened by considerations of time or distance, a child will think it good fun to look for Pelle's home in Sweden or to follow Miki to Hungary. By the natural roads of carefully selected picture-books, he will acquire a familiarity with different countries and ways of living which will illuminate the whole background of future geographical and historical study. The choice of picture books, then, becomes highly significant not only for these values, but also for the distinctive qualities of drawing and design of the countries in which they have originated.

Influence of Picture books

The picture books of a country may well point the way to a livelier sense of values in its folk tales and legends, its music and drama, its painting and native arts, its novels and social history. It is upon this assumption and out of years of experience in close association with children and books that the list of books which accompanies this article has been made.

Continued association during the formative years with good drawing and color printing, with poetry and song, with genuine nonsense and authentic prose, whether imaginative or realistic in conception, does build taste and interest in world history and world literature.

Children of the same family differ as widely in reading tastes as in other matters. Children of the same age in different families will read at different levels. The suggestion of physical age is, therefore, to be considered with full regard for the reading age of the individual, and this can be learned only by sharing the reading interests of children on equal terms. Companionship in reading, whether from a



From Caldecott's 'Picture Book', illustrating Goldsmith's 'Elegy on the Death of a Mad Dog'. (Warne.)

page of print or from "what the picture says," is a tie that binds closer than any other. No child should miss this experience in his home.

No parent should fail to recognize this opportunity to enrich his own understanding of childhood and literature. Just as the love of reading springs quite spontaneously out of the experience of reading for oneself or of sharing voluntarily the reading of one who really likes the same book, so the judgment required in making an independent choice of books for a home library may be developed by early and continued practice in choosing and weighing the choices of others.

The children's rooms of public libraries afford ideal opportunities for the child, from picture book age to well into the teens, to find out the books in which he is most interested. Parents will gain many suggestive ideas by visiting public libraries with their children when in doubt about what book to buy next. The joy of discovery is one of the chief joys of reading. To find for oneself that one book among many is good or poor is of great importance to the young reader. He has taken the first step in the never-ending obligation to make up his own mind.

Learning to Choose Wisely

Boys and girls in companionship with the books of well-selected children's libraries are not merely choosing the books they wish to read and to use, but by choosing freely they are learning how to discriminate, to judge, to tolerate, to admire. They may not be able to tell exactly what they are learning; yet when they are entrusted with funds to add to the libraries already started for them by their parents, they give convincing evidence that they know which books to buy and which ones to rely upon the library or the school to supply. It is with the expectation of this reliance upon the library or the special book-shop to recommend the most up-to-date books for purchase in the fields of science, the mechanical arts, games, and sports, that such books do not appear in the accompanying list.

When to Start a Library

The age at which children begin to have money to spend is the age at which they may well begin to buy books for their library. Few children will make many purchases before they are seven; and we may assume that the floor-plans and the door and window spaces for the first three stories of "Seven Stories High"—the

child's own library—will be built by parents in intimate touch with their children and with the books they already have. Special book-shelves should be provided within reach of the child, who shares with the book-lover the delight of the feel of the book in his hand.

Avoid Too Many Books

It is a mistake to provide many books for the young child; better, a few which are worth looking at again and again. Indiscriminate gifts of garish books for

babies should no more be tolerated than indiscriminate feeding. A child of five once made the scathing comment, as she pointed to a shelf of non-descript picture story-books, "Those are such books as daddy brings from the drug store. My *real* books are in my room." The father in question had been, as a boy, a great admirer of Howard Pyle and still treasured all his books among his own possessions. He had not taken time to consider the difference between *any* book for a child of five and a real book. Nor had it occurred to him that interest in art, whether pictorial or literary, grows according to what it feeds upon when young.

Though some children take to books and reading like ducks to water, and others do not, many are given the desire to read by a well-conceived plan for placing the right books within reach at the right time. The method involves definite preparation on the part of the parent. One must know not

TWELVE POINTS OF INQUIRY IN BUYING BOOKS

To prospective book buyers for their own home libraries, these points of inquiry are suggested:

1. *Is it a book you can and want to read now?*
2. *What is it about?*
3. *Who wrote it?*
4. *Is the author a good writer? How do you know?*
5. *Who illustrated the book?*
6. *Do the pictures tell you anything?*
7. *Is the book well printed?*
8. *Has it an attractive binding?*
9. *Is there a better book on the same subject?*
10. *Is there a more expensive or a cheaper edition of the same book? Which do you prefer to own and why?*
11. *Will the purchase of this book make your library more interesting and more varied?*
12. *Is it a book you really want to own or just read and pass along?*

only children's books in relation to books in general, but also the reactions of children to them at different stages. There are many printed lists and articles on children's reading which may be consulted. The parent who wishes to enjoy the unbroken companionship and confidence of his children will take time to consult them and to make such a plan for his own family as the children themselves will become interested to carry on and enlarge from year to year.

Pleasures of Building a Library

Children, when given a fair chance, are very much interested in personal ownership of books. They like to build libraries of their own. They like to separate and arrange their books on the shelves and count the number and the kind of books they own. Moreover, they are often excellent critics of books from whom an older reader can learn much.

This critical instinct is strengthened by thoughtful buying of books and by a certain amount of experience

in clearing deadwood from their book shelves from year to year. No one sees more quickly that a book of scientific or historical information is inaccurate or out of date than the intelligent boy of 11 to 13 years of age. He is accustomed to consulting books in well-conducted school or public libraries. He should be allowed to buy books that he knows have reliable information. He should not be given books that are selected at random or because they seem to be a bargain. (*See also Bibliography.*)

The choice of an up-to-date, well-illustrated school and home encyclopedia is of first importance. The effect on continuous interest in reading for pleasure and for information by a growing family with changing tastes makes such a set indispensable. A good dictionary is also important in the home library. (*See also Reference Books.*)

More thoughtful purchase of children's books as books rather than as mere toys or articles of merchandise leads to clearer realization that growth in knowledge and strength of character come from literature that is a record of life itself. The sense of fun, the love of beauty, the power to contemplate both the visible world and the unseen, the skill to make practical application of what one sees and feels and knows in the ordinary affairs of everyday life—all these are to be found in children's books of the present day as

well as of an earlier time. Since this is so, contemporary publications of quality and appeal have been listed below, side by side with well-known classics.

Books of Proved Value

In considering the successive stages of such a list, arranged as a kind of progressive treatment of reading viewed as an art rather than a science, it should be remembered that every so-called "classic" of childhood was once a new book. It is not the purpose of the following list to include all the books that any one child should read, nor is it designed to cover all branches of knowledge. Its value is rather to offer certain fundamental materials that have been tested and a plan that will aid constructive thought and expression on the part of boys and girls.

Since reading has long been accorded its own place among sports as well as among the essential requirements of a sound education, it is well for parents to remember that a high degree of skill in any contest is the result of fearlessness and long practice.

"We assimilate knowledge less through our intellects than our temperaments," says James Stephens, "and a young person can by no effort look through the eyes of an older." Boys and girls who are living in increasing intimacy with well-chosen books are making enduring friendships in their discovery of the world. (*See also Reading.*)

A List of Books for Children's Own Libraries

For Children under Three Years Old

The Farmer's Boy. By Randolph Caldecott. (Warne.) An ideal first picture book for a baby, with all the farmyard animals. One of 16 books in board covers by an English artist whose work was distinguished for simplicity of line.

Pitschi. By Hans Fischer. (Harcourt.) A lively kitten at play with other animals in a picture book done in sparkling colors, with simple text, by a distinguished Swiss artist.

Animal Folk Songs for Children. By Ruth Crawford Seeger. Illustrated by Barbara Cooney. (Doubleday.) Delightful pictures and jolly new songs for the family to sing.

Ring o' Roses. By L. Leslie Brooke. (Warne.) A picture book of old rhymes in clear soft colors. This English artist also illustrated 'Andrew Lang's Nursery Rhyme Book'.

Appley Dapply's Nursery Rhymes. By Beatrix Potter. (Warne.) This artist is the creator of a series of little books in color which are true pictures of animal life and the English countryside.

An Apple Pie. By Kate Greenaway. (Warne.) Little children enjoy this A B C book by an artist who has true feeling for childhood. 'Under the Window' and 'Marigold Garden' are charming books.

Two Little Trains. By Margaret Wise Brown. Illustrated by Jean Charlot. (W. R. Scott.) The distinguished litho-

graphic drawings in soft colors tell their own story of a journey west across the country in a streamlined train and an old steam train.

Pelle's New Suit. By Elsa Beskow. Translated by Marian Woodburn. (Harper.) A realistic picture book in color by a Swedish artist whose books are old favorites of children.

The Chicken World. By E. Boyd Smith. (Putnam.) Lively drawings of chickens by an American artist who has made a number of picture books in color.

The Hey Diddle Diddle Picture Book. By Randolph Caldecott. (Warne.) One of four famous English picture books children should own. Caldecott excelled in the drawing of horses and dogs.

The A B C Bunny. By Wanda Gág. (Coward-McCann.) A beautiful picture book. An adventurous bunny runs back to nature by way of the alphabet. The story has been set to music for the end papers.

The Nursery Rhyme Book. Edited by Andrew Lang. Illustrated by L. Leslie Brooke. (Warne.) A full collection of

Mother Goose rhymes which includes a valuable preface and notes. The pictures delight both children and parents. Children also like 'The Little Mother Goose'. Illustrated by J. W. Smith. (Dodd.)



This is the little pig who cried "wee-wee-wee" all the way home, before he was lost. Drawn by L. Leslie Brooke in his 'Ring o' Roses', a collection of Mother Goose rhymes. (Warne.)

In My Mother's House. By Ann Nolan Clark. Illustrated by Velino Herrera. (Viking.) Pueblo Indian life in a lovely picture storybook.

Cocolo. By Bettina Ehrlich. (Harper.) A beautiful large-size picture book with water-color drawings of an island in the Adriatic where Cocolo, a little donkey, lives with a poor fisherman and his family. 'Cocolo Comes to Amer-

ica' (Harper) is a companion book in which the artist's feeling for American scenes is as appealing to parents as it is to children.

Complete Nonsense Book of Edward Lear. Edited by Lady Strachey. (Dodd.) This edition contains all the original pictures and verses dating from 1843. Indispensable for a home library.

For Children from Three to Five Years Old

The Tale of Peter Rabbit. By Beatrix Potter. (Warne.) The famous Peter Rabbit made his first appearance in this little book. 'Benjamin Bunny', 'Squirrel Nutkin', 'Mrs. Tiggy-Winkle', 'Mr. Jeremy Fisher', and 'Tom Kitten' are companion volumes. The author is also the artist.

The Animal Frolic. By Toba Sojo. (Putnam.) A famous old Japanese animal scroll reproduced in a picture book for the whole family.

Three Blind Mice. By J. W. Ivimey. Illustrated by Walton Corbould. (Warne.) An old rhyme with pictures children like.

Johnny Crow's New Garden. By L. Leslie Brooke. (Warne.) A new picture storybook of birds and animals. A companion to 'Johnny Crow's Garden' and 'Johnny Crow's Party'.

The Little House. By Virginia Lee Burton. (Houghton.) A modern American picture storybook of originality and charm for children of any age.

The Rooster Crows. By Maud and Miska Petersham. (Macmillan.) A jolly picture book of American rhymes, finger plays, and jingles in full color.

The Little Carousel. By Marcia Brown. (Scribner.) A horse-drawn merry-go-round brings life and gaiety to a city street. 'Stone Soup' by the same artist is for older children.

Who Goes There? By Dorothy P. Lathrop. (Macmillan.) A true-to-nature picture storybook.

Sing Song. By Christina Rossetti. (Macmillan.) Poems and rhymes by an English poet.

In the Forest. By Marie Hall Ets. (Viking.) A parade of wild animals led by a little boy with a tin horn. The author-artist has child memory of Wisconsin woods.

Jeanne-Marie Counts Her Sheep. By Françoise. (Scribner.) A distinguished picture book in bright colors by the French artist of 'Springtime' and 'The Gay Mother Goose'.

The Cock, the Mouse and the Little Red Hen. By Félicité Le Fèvre. With pictures by Tony Sarg. (Macrae Smith.) A favorite for both pictures and story.



This "little dog laughs to see the sport," to be found in 'Tales of Laughter' edited by Kate Douglas Wiggin and Nora Smith. The lively illustrations are by Elizabeth MacKinstry. (Doubleday.)

Helen Sewell. (Viking.) True-to-life stories of a Texas childhood with universal appeal.

A B C Book. By C. B. Falls. (Doubleday.) The best modern Alphabet book by an American artist whose posters are well known. Designed for the artist's little girl who asked for "a big book of all pictures."

The Golden Goose Book. By L. Leslie Brooke. (Warne.) One of the most satisfactory picture storybooks. Contains also 'The Three Bears', 'The Three Little Pigs', and 'Tom Thumb', each of which may be had separately in paper covers.

White Snow, Bright Snow. By Alvin Tresselt. Illustrated by Roger Duvoisin. (Lothrop.) A joyous new picture book in bright colors to celebrate the first snowfall.

Juanita. By Leo Politi. (Scribner.) A birthday party and an Easter procession of children with their pets in Olvera Street, Los Angeles.

The Christ Child. Told by Matthew and Luke. With pictures by Maud and Miska Petersham. (Doubleday.) Recreates in full color and with child-like appeal the background of the boy Jesus. The text is that of the Bible.

The Story of Little Black Sambo. By Helen Bannerman. (Lippincott.) The artist-author lived in India and so did Sambo, whose story she wrote for her children in England.

Picture Tales from the Russian. By Valery Carrick. (Lippincott.) Folk stories of animals, with line drawings that children find delightful. The companion volumes also are good.

Peter and the Wolf. By Serge Prokofieff. Illustrated by Warren Chappell. (Knopf.) A distinguished picture storybook with music by the composer.

Christmas Carols. Illustrated by Hendrik Willem Van Loon. Music by Grace Castagnetta. (Simon & Schuster.) Clever drawings in color for each song. A joyous book for any age.

Madeline. By Ludwig Bemelmans. (Simon & Schuster.) The beauty of Paris and true understanding of children are in this large-size picture book in color.

Tag-Along Tooloo. By Frances Clarke Sayers. Illustrated by Helen Sewell. (Viking.) True-to-life stories of a Texas childhood with universal appeal.

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How Eliza looked after the elves tried to lift her out of bed by her hair. From 'Eliza and the Elves', by Rachel Field. Picture drawn by Elizabeth MacKinstry. (Macmillan.)



How Eliza looked in her tight little cap, taking the kinks out of her hair. Drawn by Elizabeth MacKinstry for 'Eliza and the Elves', by Rachel Field. (Macmillan.)

For Children from Five to Seven Years Old

Tales from Grimm. Freely translated and illustrated by Wanda Gág. (Coward-McCann.) The artist's pictures and translation embody all the wonder and magic of the old tales. 'Household Stories', illustrated by Johannes Troyer (Macmillan), is for older children.

A Pocketful of Rhymes. Edited by Katherine Love. (Crowell.) A well-chosen selection of poetry and verse, old and new. The red and gold binding and general format are very attractive to children.

Alice's Adventures in Wonderland and Through the Looking Glass. By Lewis Carroll. Illustrated by Sir John Tenniel. (Macmillan.) At what age Alice will appeal to a child is always a question. Be sure to choose an edition with Tenniel pictures, which have historic importance, and add it to a child's library so that it may be read as soon as it is wanted.

Tales of Laughter. Edited by Kate Douglas Wiggin and Nora A. Smith. Illustrated by Elizabeth MacKinstry. (Doubleday.) Favorite folk and fairy tales in excellent versions with lively decorations by an American artist.

The Horse Who Lived Upstairs. By Phyllis McGinley. Illustrated by Helen Stone. (Lippincott.) A fine picture storybook about a discontented city horse. Spontaneous and ageless in appeal. Exceptional drawings.

Just So Stories. By Rudyard Kipling. (Doubleday.) Juvenile edition. A book of animal stories for all ages.

Child's Garden of Verses. By Robert Louis Stevenson. Illustrated by Jessie Wilcox Smith. (Scribner.) There are many editions of Stevenson's verses. This is an attractive one.

Winnie-the-Pooh. By A. A. Milne. Illustrated by Ernest H. Shepard. (Dutton.) A modern nonsense story for lovers of Teddy Bear, Christopher Robin, and nonsense.

Finders Keepers. By Will and Nicolas. (Harcourt.) Two dogs claim the same bone in this original and amusing picture storybook in strong colors. 'The Two Reds' is by the same author and artist.

Dash and Dart. By Mary and Conrad Buff. (Viking.) A year in the life of twin fawns. True to nature and to art. Sensitive line drawings. Full pages in colors.

Children of the Northlights. By Ingri and Edgar Parin d'Aulaire. (Viking.) The artists went to Lapland to make the sketches and absorb the colors and other impressions which have gone to the making of a beautiful and true-to-life picture storybook.

The Wonderful Locomotive. By Cornelia Meigs. Illustrated by Berta and Elmer Hader. (Macmillan.) A good railroad story first told by Cornelia Meigs to her nephew.

Davy and the Goblin. By Charles Carryl. Illustrated by E. B. Bensell. (Houghton.) A dream story by an American author. Inspired by 'Alice in Wonderland' but with an original quality of its own.

Cinderella. By Marcia Brown. (Scribner.) A free translation from the French of Perrault with lovely interpretive pictures in luminous colors.

Little Boy Brown. By Isobel Harris. Illustrated by André François. (Lippincott.) A little city boy tells what happened when he spent a day in the country. The pictures are original and fascinating.

Susanna's Auction. Illustrated by Boutet de Monvel. (Macmillan.) (Little Library.) An amusing story of a naughty little French girl with expressive drawings in black and white.

Little Girl of Long Ago. By Eliza Orne White. (Houghton.) A true story of the life of the author's mother and that of her friend Lucretia P. Hale.

Ola. By Ingri and Edgar Parin d'Aulaire. (Doubleday.) A beautiful picture storybook of Norway which is authentic in spirit and in detail.

The Velveteen Rabbit. By Margery Wil-

liams Bianco. Illustrated by William Nicholson. (Doubleday.) The story of a nursery toy and how it became real, with very lifelike illustrations in color. A favorite Christmas or Easter story.

The Biggest Bear. By Lynd Ward. (Houghton.) This first picture storybook by a distinguished artist will delight boys of any age.

A Roundabout Turn. By Robert H. Charles. Illustrated by L. Leslie Brooke. (Warne.) A nonsense tale in rhyme with ageless appeal.

When We Were Very Young. By A. A. Milne. Illustrated by Ernest H. Shepard. (Dutton.) Rhymes with pictures which have delighted both children and grownups by their dramatic quality.

Millions of Cats. By Wanda Gág. (Coward-McCann.) The most popular American picture storybook of recent years.

Little Toot. By Hardie Gramatky. (Putnam.) A tugboat in New York harbor is the hero of a refreshing book illustrated with water colors.

Down, Down the Mountain. By Ellis Credle. (Nelson.) A picture storybook about two children, Hetty and Hank, who live in a log cabin in the Blue Ridge Mountains. Original and true to life.

My Father's Dragon. By Ruth Stiles Gannett. Illustrated by Ruth Chrisman Gannett. (Random.) An adventurous story of a little boy and his secret journey to Wild Island. Perfectly illustrated.

The Village Tree. By Taro Yashima. (Viking.) In full-color pictures and simple text the artist tells

of the village in Japan where he grew up. 'Plenty to Watch' tells more about the same village.

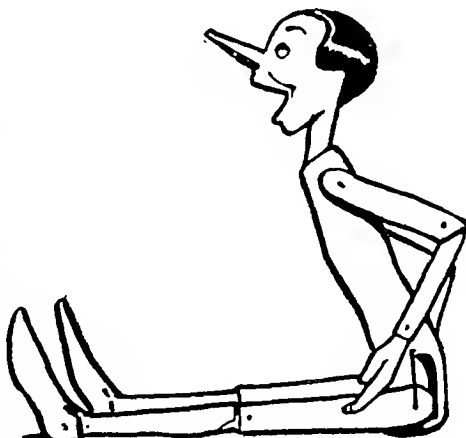
Tico-Tico. Photographs by Ylla. Story by Niccolò Tucci. (Harper.) A beautiful picture book of animals with an amusing story of an adventurous squirrel. The artist is a famous photographer of animal life.

East o' the Sun and West o' the Moon. Translated by Mrs. Gudrun Thorne-Thomsen. (Row.) Old tales from the Norwegian retold by a born storyteller who has written a lovely book about her native country, 'In Norway'. Illustrated by Eyvind Earle. (Viking.)

English Fairy Tales. By Joseph Jacobs. (Putnam.) Stories



Hänsel and Gretel escape from the witch's wood by riding across the stream on a duck's back. From a volume of immortal German fairy tales, 'Household Stories by the Brothers Grimm'. (Macmillan.) Translated by Lucy Crane. Illustrated by Walter Crane.



Pinocchio, the marionette, as Attilio Mussino pictured him for the story of that name by Collodi. (Macmillan.)

to tell or read aloud. Joseph Jacobs wrote them down just as he heard them told by English country folk.

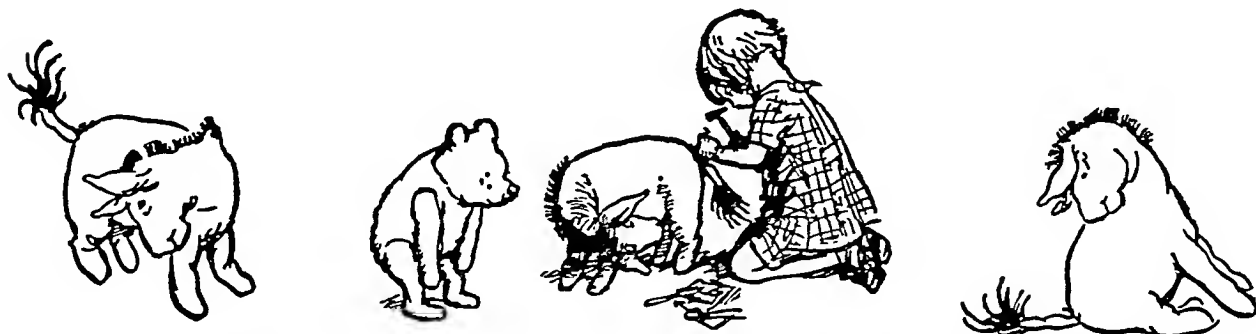
Wheel on the Chimney. By Margaret Wise Brown and Tibor Gergely. (Lippincott.) Storks in the nest and in full flight over Europe and Africa. Superb pictures in color. Simple text.

Little Tim and the Brave Sea Captain. By Edward Ardizzone. (Oxford.) A picture story-book of life at sea from vigorous water colors first painted for the artist's little son.

the New Testament. Each of the thirteen full-page drawings is a deeply felt interpretation of the story illustrated.

The Painted Pig. By Elizabeth Morrow. With pictures by René D'Harnoncourt. (Knopf.) A Mexican picture book in many colors with a true story of Mexican life by Mrs. Dwight Morrow.

Angelo the Naughty One. Story by Helen Garrett. Pictures by Leo Politi. (Viking.) Children find the everyday adventures of this little Mexican boy irresistible.



In the center picture Christopher Robin is fastening Eeyore the donkey's tail more securely for him, while Winnie-the-Pooh, the Teddy bear, looks on with great interest. The pictures at either side show Eeyore,

very happy to have his tail again, admiring it from all angles. These illustrations by Ernest H. Shepard are for 'Winnie-the-Pooh', a collection of stories about a little boy and his toys, by A. A. Milne. (Dutton.)

Make Way for Ducklings. By Robert McCloskey. (Viking.) Boston is the true background for this adventurous family of ducklings. A robust and beautiful picture book. 'Lentil', the story by the same author of the boy who wakes up an Ohio town with his harmonica, appeals to the next age group and to adults.

A First Bible. Illustrated by Helen Sewell. (Oxford.) The text is that of the King James Bible, selected and arranged by Jean West Maury from the Old Testament and

The Story about Ping. By Marjorie Flack and Kurt Wiese. (Viking.) A jolly picture storybook of a duck whose home is a Chinese houseboat.

The Five Chinese Brothers. By Claire Huchet Bishop and Kurt Wiese. (Coward-McCann.) A dramatic retelling of an old Chinese tale which appeals to boys of any age.

Pinocchio. By C. Collodi. With illustrations after Attilio Mussino. (Macmillan.) The adventures of an Italian marionette fascinate children of all ages.

For Children from Seven to Nine Years Old

Pictures to Grow Up With. By Katherine Gibson. (Studio.) A fresh presentation of pictures from medieval times to contemporary painters accompanied by brief clear text.

The Story of Appleby Capple. Written and illustrated by Anne Parrish. (Harper.) Art, nature, adventure, and nonsense in terms of the alphabet. For children who find reading a big book great fun. Each letter of the alphabet is given a poem as well as a part to play in the story.

Gulliver's Travels. By Jonathan Swift. Illustrated by Aldren Watson. (Grosset.) Children read this famous satire as a wonder story. In this edition the text has been revised and abridged.

Puss in Boots. A Free Translation from Charles Perrault. By Marcia Brown. (Scribner.) A distinguished picture book.

The Tailor of Gloucester. By Beatrix Potter. (Warne.) A Christmas story of rare charm and literary quality. John Masefield likes this story.

The Story of Doctor Dolittle. By Hugh Lofting. (Lippincott.) The first and best of several books telling the adventures of the famous animal doctor. Illustrated by the author and first written for his own children.

Snow White and the Seven Dwarfs. Freely translated



The little wooden doll and the mistress she remembered as she lay in the attic forgotten. From 'The Little Wooden Doll', by Margery Williams Bianco. Illustrated by Pamela Bianco. (Macmillan.)

and illustrated by Wanda Gág. (Coward-McCann.) A lovely book for any age.

At the Palace Gates. By Helen Rand Parish. Illustrated by Leo Politi. (Viking.) Humor and adventure distinguish this story of a Peruvian Indian boy who sets up as a bootblack in front of the president's palace in Lima.

An Inheritance of Poetry. Collected by Gladys L. Adshead and Annis Duff. Illustrated by Nora S. Unwin. (Houghton.) Love of poetry and reliance upon it for everyday reading in the family are implicit in this fine selection and arrangement from English and American poetry. Traditional songs and living poets are represented. An ageless book.

The Wonder Book. By Nathaniel Hawthorne. Illustrated by Gustaf Tenggren. (Houghton.) This edition also contains 'The Tanglewood Tales'.

Arabian Nights Entertainment. Edited by Andrew Lang. (Longmans.) An attractive edition in large print with fewer stories is edited by Kate Douglas Wiggin. (Scribner.)

In the Days of Giants. By Abbie Farwell Brown. (Houghton.) The most satisfactory rendering of the Norse myths for younger children.

The Great Gepp. By William Pène DuBois. (Viking.) A

fantastic story of a red- and white-striped circus horse with interpretive drawings in color.

Rabbit Hill. By Robert Lawson. (Viking.) A book of rare distinction. Pictures and text for any age. Connecticut background.

Aesop's Fables. Edited by Joseph Jacobs. (Macmillan.) Illustrated by Richard Heighway. An excellent edition of Aesop. Children will appreciate fables more at this age than when younger.

The Jungle Book. By Rudyard Kipling. (Doubleday.) Children have their favorite stories in the 'Second Jungle Book' as well as in the first. Kipling should be read aloud.

Uncle Remus, His Songs and His Sayings. By Joel Chandler Harris. Illustrated by A. B. Frost. (Appleton.) A. B. Frost re-created these stories with his pictures, which are inseparable from them. Read aloud.

The Wonder Clock. By Howard Pyle. (Harper.) An indispensable book for the whole family in which Howard Pyle has re-created old tales and legends in pictures as well as in words.

Honk the Moose. By Phil Stong. Pictures by Kurt Wiese. (Dodd.) An uproarious modern story of a Minnesota winter. Pictures are exactly right for the yarn.

The Chippendale Dam. By Hugh Troy. (Oxford.) A spirited modern story with a folk quality. Delightful pictures in color of pet beavers, Chippendale furniture, and the Metropolitan Museum of Art.

The Magic Fishbone. By Charles Dickens. Illustrated by F. D. Bedford. (Warne.) A gay holiday fantasy of the Princess Alicia, her 17 children, and the Fairy Grandmarina. Illustrated also by Louis Slobodkin. (Vanguard.)

Water Babies. By Charles Kingsley. Illustrated by J. W. Smith. (Dodd.) An attractive edition of a well-known classic which requires skipping to make it acceptable to some children.

No Room. By Rose Dobbs. Illustrated by Fritz Eichenberg. (Coward-McCann.) An old tale retold with humor in text and pictures.

The Little Lame Prince. By Mrs. D. M. Craik. Little Library Edition. (Macmillan.) 'The Adventures of a Brownie' is published as a companion volume.

Mr. Bumps and His Monkey. By Walter de la Mare. Illustrated by Dorothy P. Lathrop. (Winston.) A fascinating story of the friendship between an English sailor and a very wise monkey who is trained for the stage. Pictures in color appeal to any age.

The Doll Who Came Alive. By Enys Tregarten. Edited by Elizabeth Yates. Illustrated by Nora Unwin. (Day.) A Cornish fairy tale of Jyd and her doll, with lovely pictures in color.

Swiss Family Robinson. By Johann David Wyss. Illustrated by Jeanne Edwards. Rain-



This mouse has just called a council to decide how to provide some clothes for the little wooden doll. Drawn by Pamela Bianco for 'The Little Wooden Doll'.

bow Classics. (World Publishing Company.) A hardy perennial among new editions of children's books.

Pocahontas. By Ingrid and Edgar Parin d'Aulaire. (Doubleday.) Full-page pictures in brilliant colors give fresh life and meaning to a favorite story.

Henner's Lydia. By Marguerite De Angeli. (Doubleday.) A picture story-book in color of the Pennsylvania Dutch country by an artist who has intimate knowledge of its life.

Andy and the Lion. By James Henry Daugherty. (Viking.) Based on the old story of Androcles and the Lion. Vigorous drawings and understanding of the small boy make this a picture book for any age.

Hari, the Jungle Lad. By Dhan Gopal Mukerji. (Dutton.) A true story of the everyday life of an East Indian boy in which he has many adventures in the jungle.

Charlotte's Web. By E. B. White. Pictures by Garth Williams. (Harper.) Life in the barn cellar and on the farm. A wise and humorous book with many amusing pictures of the animal and human characters.

Chi-Wee. By Grace Moon. Illustrated by Carl Moon. (Doubleday.) The story of a little Indian girl in the American desert of which Carl Moon's pictures give an excellent idea.



Mr. Possum tells his troubles to Brer Rabbit. From 'Uncle Remus, His Songs and His Sayings'.

Hansi. Story and pictures by Ludwig Bemelmans. (Viking.) True and amusing adventures of a little boy of Innsbruck who spent the Christmas holidays with his uncle in a wonderful old house in the Austrian Tyrol.

Mei Li. By Thomas Handforth. (Doubleday.) An American artist while living in China made a picture storybook which is true to Chinese life. A distinguished book.

Little Men. By Louisa M. Alcott. (Little.) This book, although it follows 'Little Women', interests younger girls and is read by boys.

Poems of Childhood. By Eugene Field. Illustrated by Maxfield Parrish. (Scribner.) Selected from 'Love-Songs of Childhood' and 'With Trumpet and Drum'.

The Princess and the Goblin. By George MacDonald. Illustrated by F. D. Bedford. (Macmillan.) One of the best of wonder stories. 'Princess and Curdie', illustrated by Dorothy P. Lathrop, is a sequel.



Brer Rabbit, before he lost his long bushy tail. In 'Uncle Remus, His Songs and His Sayings', a noted collection of plantation stories, by Joel Chandler Harris. Illustrations by A. B. Frost. (Appleton.)

The Little Wooden Doll. By Margery Bianco. Illustrated by Pamela Bianco. (Macmillan.) An appealing story with delightful pictures by an artist who was a child when she made them.

Peter Pan. By James M. Barrie. Illustrated by Nora S. Unwin. (Scribner.) A new edition of this familiar story of the boy who would not grow up. Formerly published under the title of 'Peter and Wendy'.

Many Moons. By James Thurber. Illustrated by Louis Slobodkin. (Harcourt.) A charming recent fairy tale. 'The Great Quillow' (Harcourt) has an appeal for all ages. Both stories are original.

Rootabaga Stories. By Carl Sandburg. Illustrated by Maud and Miska Petersham. (Harcourt.) Nonsense, fantasy, and reality are in these very original American stories. Read aloud.

Nicholas. By A. C. Moore. Illustrated by Jay van Everen. (Putnam.) A story of New York. 'Nicholas and the Golden Goose' carries it to Europe.

Henry Beston's Fairy Tales. By Henry Beston. Illustrated by Fritz Kredel. (Aladdin.) A book of modern fairy tales of exceptional quality. Good to read aloud, attractive format.

Freddy Goes to Florida. By Walter R. Brooks. Illustrated by Kurt Wiese. (Knopf.) Farmyard animals travel to Florida by way of Washington. Well written and amusing to read aloud. The former title was 'To and Again'.

Johnny Appleseed and Other Poems. By Vachel Lindsay. (Macmillan.) This volume includes poems both for little children and for older ones.

Peterkin Papers. By Lucretia P. Hale. Illustrated by Harold Brett. (Houghton.) An old favorite among "funny books" with new pictures in color.

And to Think That I Saw It on Mulberry Street. By Dr. Seuss. (Vanguard.) A very original picture book in bright colors with a complete story in rhyme. "The cleverest book I have met with for many years," says Beatrix Potter. 'The 500 Hats of Bartholomew Cubbins' is a modern fanciful tale which has the quality of legend. Universal in its appeal.

Emil and the Detectives. By Erick Kästner. Translated by May Massee. Illustrated by Walter Trier. (Doubleday.) An excellent translation of the adventures of high-spirited small boys of Berlin.

Mary Poppins. By P. L. Travers. Illustrated by Mary Shepard. (Harcourt.) A strong Australian wind blows Mary Poppins with umbrella and carpetbag into a story that is pure fun.

Wild Animals I Have Known. By Ernest Thompson Seton. (Scribner.) One of the first popular storybooks about wild animals.

The Blue Fairy Book. Edited by Andrew Lang. (Longmans.) The first of the famous 'Colored Fairy Books' of folk and fairy tales and legends from many lands of which a new and revised edition is published.

Rhymes and Verses, Collected Poems for Children. By Walter de la Mare. (Holt.) 'Peacock Pie' is included in this edition of the English poet.

Floating Island. Written and illustrated by Anne Parrish. (Harper.) An original and remarkably well-written story of the adventures of a family of dolls shipwrecked on a tropical island.

The Courage of Sarah Noble. By Alice Dalgliesh. Illustrated by Leonard Weisgard. (Scribner.) An exceptional true story of an eight-year-old child's adventures with an Indian family during pioneer days in Connecticut.

Thimble Summer. By Elizabeth Enright. (Rinehart.) A charming modern story of a little girl's summer on a Wisconsin farm. 'The Sea Is All Around' has a Nantucket background.

Little House in the Big Woods. By Laura Ingalls Wilder. Illustrated by Garth Williams. (Harper.) The drawings for this true story of life in a Wisconsin log cabin are as finely American as the text.

The Boy Who Could Do Anything, and Other Mexican Folk Tales. Retold by Anita Brenner. Illustrated by Jean Charlot. (W. R. Scott.) True to Mexico in text and illustrations. Excellent format. Some of the tales are Indian in origin.

Pancakes-Paris. By Clair Huchet Bishop. Illustrated by Georges Schreiber. (Viking.) A true-to-life story of French children and American soldiers just after World War II. The pictures are remarkably fine.

Wind Island. By Hedvig Collin. (Viking.) A true picture storybook of life on Fanö Island off the coast of Denmark. Full of the color, atmosphere, and real people all children love. The artist-author is well known as an artist in Scandinavian countries.

Spunky. By Berta and Elmer Hader. (Macmillan.) A fine story of a Shetland pony told by the artists in words and pictures.

Pilgrim's Progress. By John Bunyan. Illustrated by George Cruikshank. (Oxford.) Complete text. A retold version by Mary Godolphin. Illustrated by Robert Lawson. (Lippincott.)

Robinson Crusoe. By Daniel Defoe. Illustrated by E. B. Smith. (Houghton.) Full-page pictures in color, clear print.

The Book of Discovery. By M. B. Syngé. Illustrated. (Putnam.) A capital book on exploration. Attractive in make-up with interesting illustrations and maps.

Heidi. By Johanna Spyri. With an introduction by Angelo Patri. Illustrated by Agnes Tait. (Lippincott.) A popular story of a little Swiss mountain girl.

Adopted Jane. By Helen F. Daringer. Illustrated by Kate Seredy. (Harcourt.) An exceptional story of a girl in an orphan home and her longing for a real home like other people.

George Washington. By Genevieve S. Foster. (Scribner.) The most interesting book about Washington for children of this age. 'Abraham Lincoln' is a companion book.



ADVENTURES IN A ZOO

Nicholas visits the Bronx Park Zoo and rides on a tortoise, while the eagle and the wolf look on, asking him to come see the other birds and animals. Illustrations by Jay van Everen, in 'Nicholas', by Anne Carroll Moore. (Putnam.)

For Children from Nine to Eleven Years Old

The Merry Adventures of Robin Hood. By Howard Pyle. (Scribner.) The best prose version of the Robin Hood ballads. Illustrated by the author.

The Lord Is My Shepherd. Stories from the Bible Pictured in Bible Lands. Arranged and illustrated by Nancy Barnhart. (Scribner.) An introduction to the Bible with distinguished drawings in black and white. A beautiful book. The appendix gives references to the passages in the King James Version of the Bible where each story may be found.

Treasure Island. By Robert Louis Stevenson. Illustrated by N. C. Wyeth. (Scribner.) "The best of boys' books and

a book to make one a boy again. The buccannery are real bloody rascals, no sham of it." —George Meredith.

The Hobbit; or, There and Back Again. By J. R. R. Tolkien. Illustrated by the author. (Houghton.) A story of rare beauty and originality in which dwarfs and dragons live again for imaginative boys and girls.

Fairy Tales. By Hans Christian Andersen. Translated by Signe Toksvig. Illustrated by Eric Pape. (Macmillan.) A well-known edition. Elizabeth MacKintyre's fine illustrations in color distinguish the Coward-McCann edition.

The Wonderful Adventures of Nils. By Selma Lagerlöf. Translated by Velma Swanson Howard. Illustrated by Hans Baumhauer. (Pantheon.) A wonder story about Sweden. This edition contains also 'The Further Adventures of Nils'.

The Children's Homer: Adventures of Odysseus and The Tale of Troy. By Padraic Colum. Illustrated by Willy Pogany. (Macmillan.) A spirited retelling by an Irish poet.

Bhimsa, the Dancing Bear. By Christine

Weston. Pictures by Roger Duvoisin. (Scribner.) The background of this story is India but the boy and the bear have a universal appeal heightened by the pictures.

Fog Magic. By Julia M. Sauer. Illustrated by Lynd Ward. (Viking.) A fine imaginative story inspired by the author's feeling for Nova Scotia, past and present. The interpretive drawings reflect the mood and time.

Master Skylark. By John Bennett. Illustrated by Reginald Birch. (Grosset.) A vivid tale of Shakespeare's time by an American writer who also wrote 'Barnaby Lee'. (Appleton.)

Puck of Pook's Hill. By Rudyard Kipling. Illustrated by Arthur Rackham. (Doubleday.) This book and 'Rewards and Fairies' have the essential spirit of English history in them.

A Little Boy Lost. By W. H. Hudson. (Knopf.) A dream story with the South American childhood of the great naturalist for its background.

The Wind in the Willows. By Kenneth Grahame. Illustrated by E. H. Shepard. (Scribner.) The joyous adventures of Water Rat, Mole, Badger, and Toad in the world of River Bank and Wild Wood. 'Bertie's Escapade' (Lippincott) is also illustrated with sparkling drawings by E. H. Shepard.

At the Back of the North Wind. By George MacDonald. Illustrated by F. D. Bedford. (Macmillan.) One of the best of imaginative stories of which there are several editions.

Miss Hickory. By Carolyn Sherwin Bailey. Lithographs

by Ruth Gannett. (Viking.) Miss Hickory, with her hickory-nut head and her apple-wood body, grew in a New England orchard. Pictures make her very real.

King of the Wind. By Marguerite Henry. Illustrated by Wesley Dennis. (Rand.) A fine story of the Godolphin Arabian ancestor of Man o' War by a writer who knows horses.

The Rose and the Ring. By William Makepeace Thackeray. (Macmillan.) Thackeray made his own illustrations for this Christmas pantomime from which a charming play for marionettes can be given.

Tree Toad. By Bob Davis. Drawings by Robert McCloskey. (Lippincott.) True stories of the California boyhood of the author and his "brother Bill." Full of laughter and human interest.

Homer Price. By Robert McCloskey. (Viking.) Six original and hilarious tales out of contemporary American life with completely satisfying pictures by the author.

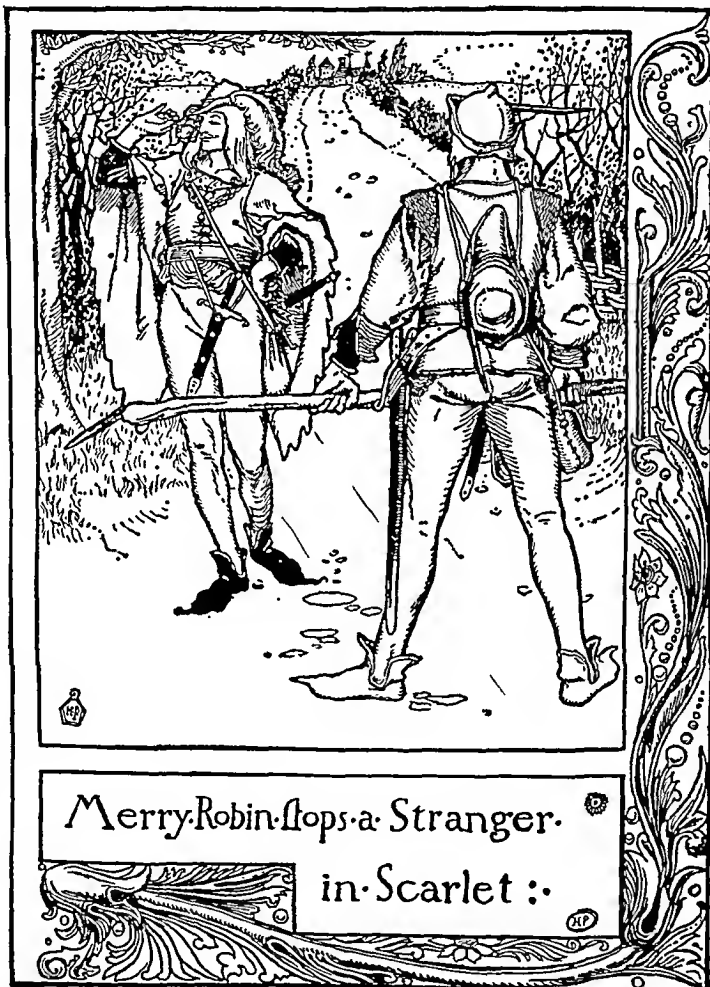
Waterless Mountain. By Laura Adams Armer. Illustrated by Sidney Armer and Laura Adams Armer. (Long-

mans.) The story of a Navajo Indian boy in search of the legends back of tribal customs.

The Country of the Dwarfs. By Paul B. du Chaillu. Illustrated by Erick Berry. (Harper.) Du Chaillu's books about Africa are still fascinating to boys because they are based upon his observations and experience as an early traveler and explorer.

Shasta of the Wolves. By Olaf Baker. (Dodd.) A remarkably good animal story by an Englishman who also wrote 'Dusty Star', the story of an Indian boy and a wolf cub.

The Call of the Wild. By Jack London. Illustrated by Paul F. Bransom. (Macmillan.) A very powerful dog story of absorbing interest to boys.



Here Robin Hood, equipped for a tussle, encounters the gorgeous, amazing Will Scarlet. The picture is from 'The Merry Adventures of Robin Hood', written and illustrated by Howard Pyle. (Scribner.)

EFFORT



"Effort" was a quality very necessary to the early pioneers, who faced the tasks of hewing down the timber, cultivating the cleared space, hunting the wild beasts of the forests, and working hard daily to preserve life itself. This illustration was drawn by James Daugherty for 'Daniel Boone: Wilderness Scout', by Stewart Edward White. (Doubleday.)

Away Goes Sally. By Elizabeth Coatsworth. Pictures by Helen Sewell. (Macmillan.) The story of a little girl of 1800 who is transplanted from Massachusetts to Maine in a little house on runners drawn by twelve oxen. Illustrations and story have true distinction. 'Alice-All-By-Herself' is also a favorite hook.

The Story of a Bad Boy. By Thomas Bailey Aldrich. Illustrated by A. B. Frost. (Houghton.) A story of the author's own boyhood adventures in Portsmouth, N. H., and a pioneer among books about boys.

The Adventures of Tom Sawyer. By Mark Twain. (Harper.) Looking back on his boyhood in Missouri, Mark Twain created Tom out of three boys he then knew.

Penrod. By Booth Tarkington. (Doubleday.) Penrod is a boy character as popular with girls as with boys.

Captains Courageous. By Rudyard Kipling. (Doubleday.) A story of the Grand Banks, in which the son of a millionaire is rescued by the *We're Here o' Gloucester*.

Daniel Boone. Written and illustrated by James H. Daugherty. (Viking.) A beautiful and timely book which has the pioneer flavor and authenticity gained from following the Boone trail.

America's Ethan Allen. By Stewart Holbrook. Pictures by Lynd Ward. (Houghton.) A vivid true story of one of the heroes of the American Revolution with interpretive illustrations in full color.

Forward, Commandos! By Margery Bianco. Illustrated by Raffaello Busoni. (Viking.) A story of the life of four boys in New Jersey which rings true to boys everywhere.

Wheel on the School. By Meindert DeJong. Pictures by Maurice Sendak. (Harper.) A whole Dutch village—children and adults—springs to life in a book whose author was born in Holland and is a natural storyteller.

Hans Brinker; or, The Silver Skates. By Mary Mapes Dodge. Illustrated by Hilda Van Stockum. (World Pub. Co.) Mrs. Dodge first told this famous story to her own two boys. It grew out of her great interest in 'The Rise of the Dutch Republic'. It also represents the pioneer sports story.

Men of Iron. By Howard Pyle. (Harper.) An exceptional story of the time of King Henry IV. 'Otto of the Silver Hand' (Scribner), a story of robber barons, is also suggested.

Sigurd and His Brave Companions. By Sigrid Undset. (Knopf.) A tale of medieval Norway. 'Happy Times in Norway' tells of the intimate family life of the great novelist and her children before the invasion.

The Silver Curlew. By Eleanor Farjeon. Illustrated by Ernest H. Shepard. (Viking.) A beautiful English fantasy with interpretive pictures.

The Bells of Bleeker Street. Written and illustrated by Valenti Angelo. (Viking.) A story of New York boys which is true to neighborhood life.

Hitty, Her First Hundred Years. By Rachel Field. Illustrated by Dorothy P. Lathrop. (Macmillan.) The story of a wooden doll who has wonderful adventures on land and sea. Authentic background of American life.

Twenty Thousand Leagues under the Sea. By Jules Verne. Illustrated by W. J. Aylward. (Scribner.) The forerunner

of modern stories of submarine adventure. Many of Jules Verne's "dreams" have been proved to have a scientific basis.

Rebecca of Sunnybrook Farm. By Kate Douglas Wiggin. Illustrated by Helen Mason Grose. (Houghton.) Rebecca was not drawn from life but is a character born of the author's lively fancy into the New England of her childhood.

Little Women. By Louisa M. Alcott. Illustrated by Jessie Willcox Smith. (Little.) A story out of Louisa Alcott's own childhood which every American girl should own.

Blue Willow. By Doris Gates. Illustrated by Paul Lantz. (Viking.) A story of rare quality.

Impunity Jane. By Rumer Godden. Illustrated by Adrienne Adams. (Viking.) Adventures of a tiny doll in a boy's pocket. A lovely book.

The Little Prince. By Antoine de Saint-Exupéry. Translated by Katherine Woods. (Harcourt.) A modern fairy tale with fresh magical qualities drawn from the stars, the African desert, and the vivid childhood memory of the French author-artist whose water colors are very childlike.

The Alhambra. By Washington Irving. Illustrated by Joseph Pennell. (Macmillan.) The best introduction to the beauty and romance of Spain.

The Three Royal Monkeys. By Walter de la Mare. Illustrated by Mildred E. Elldridge. (Knopf.) The former title was 'The Three Mulla Mulgars'.

You Can Write Chinese. By Kurt Wiese. (Viking.) Both children and adults will enjoy this unusual picture book in which the artist-author shows how to write

Chinese and how the characters have developed.

The Secret Garden. By Frances Hodgson Burnett. (Lippincott.) A mystery story with a Yorkshire garden for its setting.

The Three Policemen. Written and illustrated by William Pène Du Bois. (Viking.) A modern fabulous tale of great charm and originality. Interpretive drawings are fascinating.

Phebe Fairchild. By Lois Lenski. (Lippincott.) Authentic story of a ten-year-old Connecticut child of the 1830's. 'Strawberry Girl' is the story of a Florida Cracker family of the 1940's. Spirited pictures lend color to the story.

The Borrowers. By Mary Norton. Illustrated. (Harcourt.) An original story about "little people" who live behind walls and under floors.

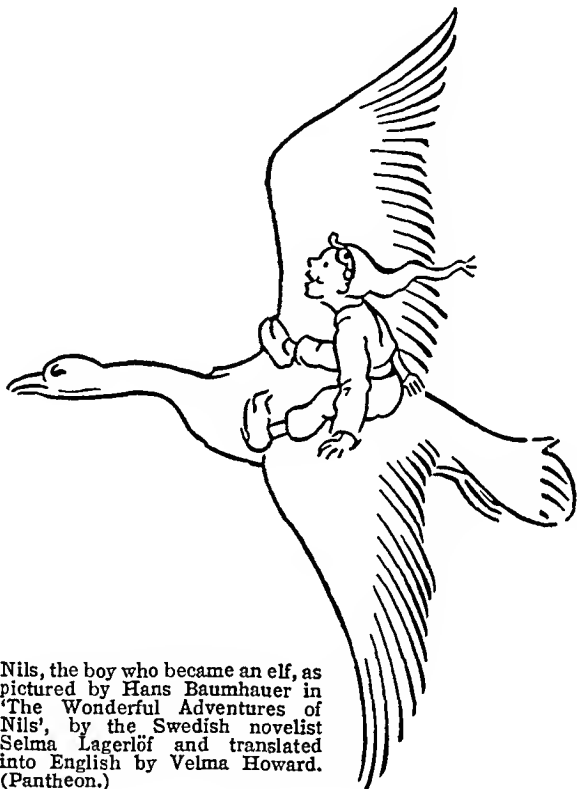
Ben and Me. Written and illustrated by Robert Lawson. (Little.) An amusing story accompanies these masterly drawings of Benjamin Franklin as observed by his "good mouse Amos." Boys of all ages find it delightful.

Understood Betsy. By Dorothy Canfield. Illustrated by Catherine Barnes. (Holt.) A bright new edition of the ever-popular story of Elizabeth Ann on a Vermont farm.

Windy Foot at the County Fair. By Frances Frost. Illustrated by Lee Townsend. (McGraw.) An unusual American family story.

The Good Master. By Kate Seredy. (Viking.) A lively young girl from Budapest goes to live on her uncle's farm in Hungary. This is a true storybook with colorful pictures.

The Moffats. By Eleanor Estes. Illustrated by Louis Slobodkin. (Harcourt.) Living children have been created in this story of a Connecticut family. 'The Middle Moffat' and 'Rufus M.' sustain their claim.



Nils, the boy who became an elf, as pictured by Hans Baumhauer in 'The Wonderful Adventures of Nils', by the Swedish novelist Selma Lagerlöf and translated into English by Velma Howard. (Pantheon.)

For Children from Eleven to Thirteen Years Old

Kidnapped. By Robert Louis Stevenson. Illustrated by N. C. Wyeth. (Scribner.) 'David Balfour' is the sequel to this stirring historical romance.

Johnny Tremain. By Esther Forbes. Illustrated by Lynd Ward. (Houghton.) A stirring novel of Revolutionary days in Boston by the author of 'Paul Revere'.

The Bold Dragoon and Other Ghostly Tales. By Washington Irving. Selected and edited by A. C. Moore. Illustrated by James Daugherty. (Knopf.) This collection contains five good mystery tales: Bold Dragoon, Devil and Tom Walker, Wolfert Webber or Golden Dreams, Guests from Gibbet Island, Dolph Heyliger.

from the Motteux translation from Cervantes by Lawrence Barret. (Knopf.) The dramatic illustrations by Warren Chappell give new life to a well-known classic.

The Story of King Arthur and His Knights. By Howard Pyle. Brandywine Edition. (Scribner.)

Secret of the Andes. By Ann Nolan Clark. Illustrated by Jean Charlot. (Viking.) A beautiful and original story of an Inca shepherd boy and his heart's desire—"to find a family." Superb pictures.

Adam of the Road. By Elizabeth J. Gray. Illustrated by Robert Lawson. (Viking.) Medieval England comes alive in this fine historical story of a wandering minstrel's son.



Elouise the Fair, with many attendants, welcomes Sir Launcelot in the courtyard of the abbey. One of the incidents from 'The Story of the Champions of the Round Table', written and illustrated by Howard Pyle. (Scribner.)

The Twenty-One Balloons. By William Pene du Bois. (Viking.) In this fantastic tale based on scientific truths, a retired professor takes a round-the-world trip in a home-made balloon and has amazing adventures. Drawings of uncommon strength and beauty by the author. A distinguished book with popular appeal.

Song of the Pines. By Walter and Marion Havighurst. Illustrated by Richard Floethe. (Winston.) The story of Norwegian lumbering in Wisconsin a hundred years ago is so full of life and color that it seems contemporary.

Bush Holiday. By Stephen Fennimore. Illustrated by Ninon MacKnight. (Doubleday.) A thrilling story out of the author's own boyhood in the Australian bush.

The Adventures of Don Quixote de la Mancha. Adapted

Daughter of the Mountains. By Louise Rankin. Illustrated by Kurt Wiese. (Viking.) A thrilling story of a girl of Tibet and her search for her lost dog. Kurt Wiese's drawings give a wonderful sense of the country.

The White Isle. By Caroline D. Snedeker. Illustrated by Fritz Kredel. (Doubleday.) Britain and Gaul in the year 200 seen through the eyes of an exiled Roman girl.

This Singing World. Edited by Louis Untermeyer. Illustrated by Florence M. Ivins. (Harcourt.) This attractive anthology contains a good proportion of modern poetry.

The Last of the Mohicans. By J. Fenimore Cooper. Illustrated by N. C. Wyeth. (Scribner.) It is over a hundred years since 'The Last of the Mohicans' was published, carrying to France and England new pictures of American Indians.

The Prince and the Pauper. By Mark Twain. (Harper.) The boy king, Edward VI, and Tom Cauty, a poor boy of the period, change places.

Columbus Sails. Written and illustrated by C. Walter Hodges. (Coward-McCann.) Imagination and vigor give color and life to this story of Columbus as told by a young English artist.

Who Rides in the Dark? By Stephen W. Meader. (Harcourt.) A stirring adventure story of stagecoach days in New Hampshire. Boys like this author.

George Washington's World. By Genevieve Foster. (Scribner.) Gives a cross section of the world at the time in readable text accompanied by many pictures by the author. Lights up American history.

The Matchlock Gun. By Walter D. Edmonds. Illustrated by Paul Lantz. (Dodd.) A dramatic true story of a New York colonial family. 'Tom Whipple' visits the Russian emperor.

Rolling Wheels. By Katharine Grey. (Little.) An absorbing story of a journey by covered wagon from Indiana to California.

Master Simon's Garden. By Cornelia Meigs. (Macmillan.) There is romance and an authentic historical background in this well-written story of New England in colonial times.

Ghond, the Hunter. By Dhan Gopal Mukerji. Illustrated by Boris Artzybasheff. (Dutton.) Some boys may prefer 'Gay-Neck', the story of a carrier pigeon, which is illustrated by the same artist.

Smoky. By Will James. (Scribner.) The story of a cow pony written in the picturesque vernacular of the cowboy. The spirited drawings are as authentic as the text.

Swift Rivers. By Cornelia Meigs. Illustrated by Forrest W. Orr. (Little.) A finely conceived story of rafting logs down the Mississippi River from northern Minnesota in the year 1835.

The Little White Horse. By Elizabeth Goudge. Illustrated by C. Walter Hodges. (Coward-McCann.) Fantasy and reality in an exciting mystery story by a well-known English novelist. The scene is the estate of the Merryweather family in Devonshire one hundred years ago. Will appeal to the imaginative reader. Delightful illustrations.

National Velvet. By Enid Bagnold. Illustrated by Paul Brown. (Morrow.) A new edition of a fine family story of contemporary life.

Big Tiger and Christian. By Fritz Muhlenweg. Illustrated by Raffaello Busoni. (Pantheon.) A remarkable story of the adventures of a Chinese boy and an English boy in the Gobi desert in wartime.

Downright Dencey. By Caroline Dale Snedeker. (Doubleday.) An interesting story of a Quaker girl who lived on Nantucket Island a hundred years ago.

The Avion My Uncle Flew. By Cyrus Fisher. (Appleton.) An absorbing and original story of a Wyoming boy in France after the second World War.

Young Fu of the Upper Yangtze. By Elizabeth Foreman Lewis. Illustrated by Kurt Wiese. (Winston.) Life in a Chinese city vividly presented in a convincing story for boys and girls. The pictures are true to the life of the time.

Shuttered Windows. By Florence C. Means. Illustrated by Armstrong Sperry. (Houghton.) A fine story of a Northern Negro girl who goes from a Minnesota high school to live with her great-grandmother in South Carolina. This author always tells a good story.

Call It Courage. By Armstrong Sperry. (Macmillan.) The story of a boy who lived on a small island in the Pacific. 'Lost Lagoon' (Doubleday) by the same author is liked.

The Caves of the Great Hunters. By Hans Baumann. Translated by Isabel and Florence McHugh. Illustrated. (Pantheon.) A unique and thrilling presentation of art and archaeology in the form of a true adventure story.

The Adventures of Huckleberry Finn. By Mark Twain. Illustrated by Worth Brehm. (Harper.) The boy who has met Huck Finn in 'Tom Sawyer' never tires of his adventures.

Young Walter Scott. By Elizabeth Janet Gray. (Viking.) In this unusual biographical story Sir Walter Scott comes alive as a real boy growing up in a real Edinburgh. Points the way to John Buchan's life of Scott.

The Adventures of Sherlock Holmes. By Conan Doyle. (Harper.) The discovery of Sherlock Holmes is a great event in everyday life.

The Trumpeter of Krakow. By Eric Kelly. Illustrated by Angela Pruszyńska. (Macmillan.) A stirring mystery story with a background of 15th-century Poland.

The Three Musketeers. By Alexandre Dumas. Illustrated by Mead Schaeffer. (Dodd.) 'The Three Musketeers' begins in the year 1626 with the appearance of D'Artagnan and ends in 1628. 'Twenty Years After' picks up the narrative for a twelvemonth in 1648. The 'Vicomte de Bragelonne' (Page) covers the period 1660-71.

The Story of Mankind. By Hendrik Van Loon. (Live-right.) A fascinating world story illustrated with animated maps and many drawings by the author.

The White Stag. By Kate Seredy. (Viking.) A dramatic retelling in story and pictures of a famous Hungarian epic.

The Pageant of Chinese History. By Elizabeth Seeger. Illustrated by Bernard Watkins. (Longmans.) A reliable story of China, with pictorial maps.

Gandhi; Fighter Without a Sword. By Jeanette Eaton. (Morrow.) A fine and very readable biography by a well-known writer of young peoples' books.

Iron Duke. By John R. Tunis. (Harcourt.) An authentic football story by an outstanding writer on sports whose books are popular with boys.

Swallows and Amazons. By Arthur Ransome. Illustrated by Helene Carter. (Lippincott.) A lively story of six children, two sailboats, and a "desert island" located in one of the English lakes.

Lone Cowboy. By Will James. Illustrated by the author. (Scribner.) The true story of Will James's adventurous life.

Caddie Woodlawn. By Carol Ryrie Brink. Illustrated by Kate Seredy. (Macmillan.) Frontier life in Wisconsin is pictured vividly in this book. 'Anything Can Happen on the River' is about France.

The Treasure Seekers. By E. Nesbit. Illustrated by C. Walter Hodges. (Coward-McCann.) 'The New Treasure Seekers' and 'The Wouldbegoods' are companion volumes by this well-known English writer.

... and now Miguel. By Joseph Krumgold. Illustrated by Jean Charlot. (Crowell.) Miguel, a twelve-year-old boy of an old Spanish family of shepherds, has a secret wish to go with the sheep to the Sangre de Cristo Mountains. A true-to-life story of rare quality.

Roller Skates. By Ruth Sawyer. Illustrated by Valenti Angelo. (Viking.) A rare true story of Lucinda who explores New York on roller skates in the 1890's.

Pecos Bill. By James C. Bowman. (Albert Whitman.) Tall tales of "the greatest cowboy of all time" retold with imagination and humor.

A Book of Americans. By Rosemary and Stephen Vincent Benét. Illustrated by Charles Child. (Rinehart.) Original and inspiring portraits in verse.

For Readers from Thirteen Years Old Onward

Wind, Sand and Stars. By Antoine de Saint Exupéry. (Harcourt.) A true story of adventure by a French aviator who was a poet and philosopher. Covers the period 1926-36.

The Stream of History. By Geoffrey Parsons. (Scribner.) An exceptionally clear and authentic world history in one volume, written with imaginative power.

Davy Crockett. By Constance Rourke. Illustrated by

James MacDonald. (Harcourt.) An authentic biography which keeps the adventurous flavor of Crockett's character.

Banner in the Sky. By James R. Ullman. (Lippincott.) A fine story of a 16-year-old Swiss mountain climber.

The Yearling. By Marjorie K. Rawlings. (Scribner.) Florida is the background of this fine American novel, with a boy and his father the chief characters.

Drums. By James Boyd. Illustrated by N. C. Wyeth. (Scribner.) A story of the American Revolution with North Carolina for its background.

John Brown's Body. By Stephen Vincent Benét. (Rinehart.) The Civil War period comes to life in this long narrative poem. 'Western Star' by the same poet tells the story of the Virginia and New England settlements.

Abraham Lincoln: The Prairie Years. By Carl Sandburg. (Harcourt.) A biography in which the writer makes one feel the poetry at the heart of wilderness life.

Walt Whitman: Builder for America. By Babette Deutsch. (Messner.) A timely and reliable biography by an American poet. The book includes also a selective arrangement of Whitman's poetry.

Kim. By Rudyard Kipling. (Doubleday.) Kim lived a life as wild as that of the 'Arabian Nights'

Mutiny on the Bounty. By Charles Nordhoff and James Norman Hall. (Atlantic: Little.) A rousing novel of the sea, based largely on fact. The authors got the material from Admiralty records of the strange history of H. M. S. *Bounty*, which set sail from England in 1787 bound for Tahiti.

Come Hither. Selected by Walter de la Mare. Illustrated by Alec Buckels. (Knopf.) A poet's anthology of lyrical and imaginative poems, chiefly English, with introduction and notes of great value.

The Tree of Life. Edited by Ruth Smith. Illustrated by Boris Artzybasheff. (Viking.) Selections from the Literature of the World's Religions. Presented in a very beautiful book of special interest to boys and girls seeking to understand the peoples of other lands.

"Have You Seen Tom Thumb?" By Mabel Leigh Hunt. Pictures by Fritz Eichenberg. (Lippincott.) A period of American history comes to life in this story of the famous midgit.

Salt-Water Poems and Ballads. By John Masefield. (Macmillan.) A favorite volume among boys of Masefield's poems.

Moby-Dick. By Herman Melville. Illustrated by Mead Schaeffer. (Dodd.) A great sea story.

Far Away and Long Ago. By W. H. Hudson. (Dutton.) The life story of a great naturalist told by himself. Hudson wrote of the wild life and the human drama of South America and rural England.

Song of Robin Hood. Selected and edited by Anne Malcolmson. Music arranged by Grace Castagnetta. Designed and illustrated by Virginia Lee Burton. (Houghton.) A beautiful book for anyone with an interest in the ballads and in design.

Hans Christian Andersen. By Rumer Godden. (Knopf.) A perfect small biography of the great Danish storyteller whose tales have been translated into almost every language.

Lost Worlds. By Anne Terry White. (Random.) Adventures in archaeology. A book of absorbing interest.

Complete Works of William Shakespeare. (Oxford.) To possess all Shakespeare in one volume appeals to girls and boys who own copies of individual plays illustrated by Arthur Rackham or Edmund Dulac.

Lonely Crusader. By Cecil Woodham-Smith. Illustrated. (Whittlesey.) The author's abridgment of her notable biography, Florence Nightingale. Exceptional pictures of the period.

Madame Curie. By Eve Curie. (Doubleday.) "Madame Curie is, of all celebrated beings, the only one whom fame has not corrupted," said Einstein. This true story of her remarkable life confirms his words.

Invisible Louisa. By Cornelia Meigs. (Little.) The life story of Louisa M. Alcott told with feeling and rare discrimination.

Period Piece. By Gwendolen Raverat. (Norton.) The author-artist writes of her childhood and youth in Victorian England with a sparkling wit and warm affection which are reflected in her delightful drawings.

Dobry. By Monica Shannon. Illustrated by Atanas Katchamakoff. (Viking.) An unusual story of a Bulgarian peasant boy who left the farm of his ancestors to become a sculptor. The artist who made the drawings also contributed of his boyhood memories. A distinguished book.

The Bird of Dawning. By John Masefield. (Macmillan.) A fine sea story of the days of the clipper ship and China trade and a race for the London prize.

A Tale of Two Cities. By Charles Dickens. Illustrated by "Phiz" and Fred Barnard. (Dodd.) A story of the French Revolution which rarely fails to interest boys and girls.

Judith of France. By Margaret Leighton. Illustrated by Henry C. Pitz. (Houghton.) An outstanding novel in which the great-granddaughter of Charlemagne comes to life.

Les Misérables. By Victor Hugo. Illustrated by Mead Schaeffer. (Dodd.) The text of this edition has been cut to some extent. The form is attractive to boys and girls.

Introducing Charles Dickens. By May Lambertson Becker. Illustrated by Oscar Ogg. (Dodd.) This fine book by a Dickens lover brings him to life for present-day readers.

North to the Orient. By Anne Morrow Lindbergh. Maps by Charles A. Lindbergh. (Harcourt.) Describes in an unforgettable way the flight which the Lindberghs made in 1931. Records the pure magic of flying.

Tales of Mystery and Imagination. By Edgar Allan Poe. (Oxford.) Mystery stories which are masterpieces of invention and originality.

These Happy Golden Years. By Laura Ingalls Wilder. (Harp-er.) The final volume in a rare series of American story-books dealing with the pioneer youth of the author.

My Antonia. By Willa Cather. (Houghton.) This fine story of American pioneer life is a good introduction to Willa Cather's books.

Albert Schweitzer. By Joseph Gollomb. (Vanguard.) This true life story of "genius in the jungle" is written with dramatic power. Dr. Schweitzer's visit to this country has made his name well known to American boys and girls.

Gods and Heroes. By Gustav Schwab. Translated by Olga Marx and Ernst Morwitz. Illustrated from Greek vase paintings. (Pantheon.) Myths and epics of ancient Greece. A very beautiful book with wide appeal.

The Mutineers. By Charles B. Hawes. (Little.) A fine tale of the sea and adventure in the Orient.

The Leatherstocking Saga. By James Fenimore Cooper. Edited by Allan Nevins. Illustrated by Reginald Marsh. (Pantheon.) An invitation to read Cooper with a historian who loved the books as a boy. Dr. Nevins has selected and arranged in chronological order those parts of 'The Deerslayer', 'The Last of the Mohicans', 'The Pathfinder', 'The Pioneers', and 'The Prairie' which specially pertain to Natty Bumppo. A connective narrative is used where needed. The interpretive illustrations add to a very distinguished book.

Calico Bush. By Rachel Field. Illustrated by Allen Lewis. (Macmillan.) A vivid story of a young French girl's life on the Maine coast in the 18th century.

All down the Valley. By Henry Billings. (Viking.) A thrilling true story of the Tennessee Valley from the pioneer settlement of 1779 to the creation and development of TVA, illustrated with powerful drawings by the author.

The Lost Queen of Egypt. By Lucile Morrison. (Lippincott.) The romance of the wife of Tutankhamen.

The Tale of Beatrix Potter. By Margaret Lane. Illustrated. (Warne.) A fascinating story of a writer and artist of children's books who lived in the English Lake country.

The Silver Pencil. By Alice Dalgliesh. Decorations by Katherine Milhous. (Scribner.) Trinidad, England, and America seen through the eyes of a young British girl who becomes an American teacher and writer. In 'Along Janet's Road' she becomes an editor of children's books.

The Spirit of St. Louis. By Charles A. Lindbergh. Illustrated. (Scribner.) A graphic account of the planning and execution of the first solo transatlantic flight by the man who made it and has now given it an enduring place in literature.

Editor's Note.—Other annotated lists of books will be found with the articles on Hobbies and Storytelling. The article on Literature for Children is a history of children's books and illustrations; it contains a list of the best guides to the selection of children's literature.

ANCIENT AND MODERN LIBYA

LIBYA. The ancient name of Libya recalls 3,000 years of history. This name was first applied by the Greeks to the whole of Africa. Later it fell into disuse, but the Italians revived it when they took the region from the Turks. Then Italy lost Libya in the second World War. On Dec. 24, 1951, it became an independent Moslem nation called the United Kingdom of Libya.

The region lies between Tunisia and Algeria on the west and Egypt on the east. It stretches for more than a thousand miles along the Mediterranean Sea, and extends almost as far into the Sahara and Libyan deserts (for map, see Africa). With an area of 680,000 square miles, it is larger than Alaska by a hundred thousand square miles.

The parching influence of the trade winds makes the vast desert hinterland one of the hottest and most barren of countries. Ninety-five per cent of all Libya is shifting sand or barren steppe, punctured here and there by a *jebel* (the Arabic word for "mountain").

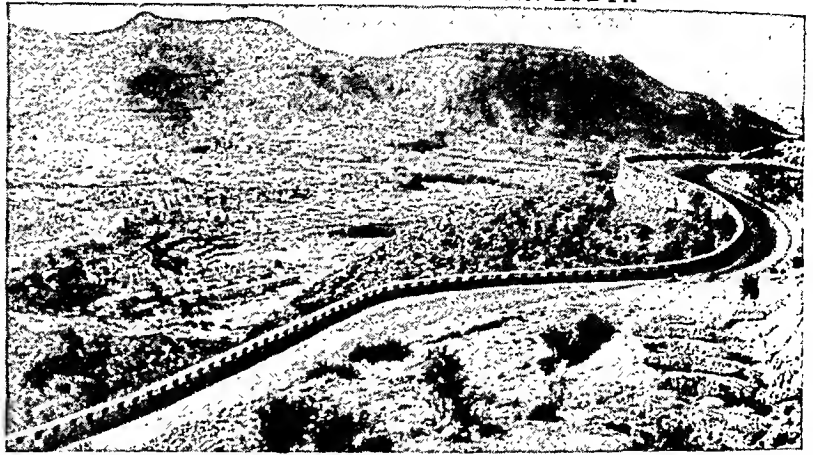
The Land and Its Products

Most of Libya is a great, limestone tableland, covered in parts



with drifting sand. In the east and the west the edge of the tableland rises sharply out of the Mediterranean. These portions are far enough north to have a Mediterranean climate with winter rains, averaging 16 inches annually at Tripoli and 11 inches at Bengasi. In the middle, where the Gulf of Sidra bites southward into the land, not even this much rain falls, and the coast is all but barren.

The western portion, Tripolitania, has a narrow coastal plain. Here cereals, cotton, tobacco, and



The paved highway above follows the coast for 1,200 miles. Stately ruins attest the splendor of Leptis Magna (center). Below, Italian colonists haul to their new farms the supplies given them by the Fascist government. But many colonists fled when the Italian army was driven out in 1943.



tropical fruits can be grown, by dry farming or irrigation. The eastern portion, Cyrenaica, has no coastal plain, but it can grow dates, olives, and barley for making beer or feeding cattle, sheep, and goats. Water for towns can be obtained by sinking artesian wells to the water table which underlies most of Libya, even in the Sahara.

The Sub-Desert and the Desert

South of the arable coastal fringe the country slopes through ever-thinning pasture lands to the sub-desert, where little grows but the alfa plant (esparto grass), a tall grass which is exported to be made into paper. The vast reaches of the Libyan and Sahara deserts make up the rest (see Sahara).

About 300 miles south of the Gulf of Sidra is a depression in the tableland called the Hofra (meaning "ditch"). This dips near enough to the water table to produce oases in some spots; water can also be obtained from shallow wells. A western group of oases, called the Fezzan, supports the region's largest town, Murzuch. Here date palms, olives, figs, and almonds relieve the desert barrenness, and some grain can be grown. The Cufra oases to the east were controlled by fanatical Senussites, until the Italians broke their power in 1928.

Industries other than farming are few. The sponge and tunny fisheries are important, and salt and sulphur are mined. Tobacco is manufactured, and carpets, leather articles, and embroidered fabrics.

Government and Modern History

Italy gained possession of Libya after the Italo-Turkish war of 1911-12. The coastal area was later

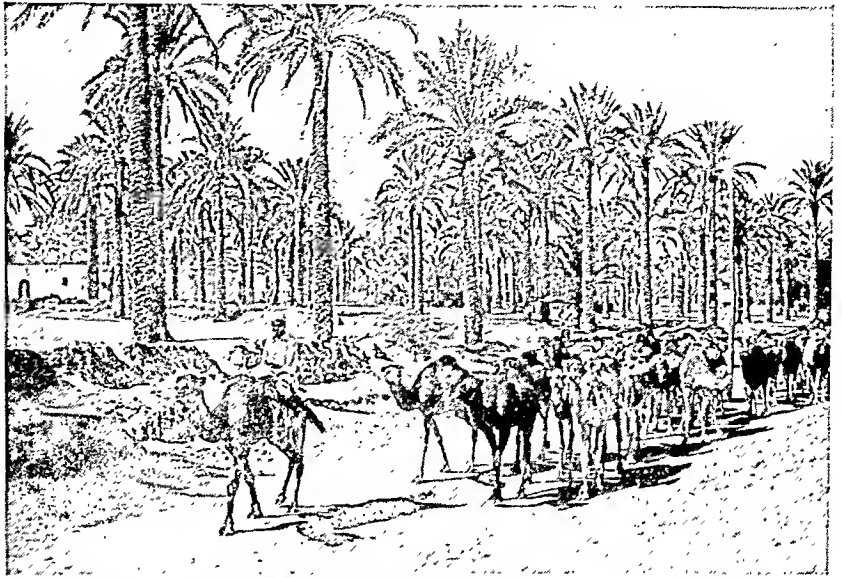
divided into provinces and integrated into the Italian kingdom. The desert was organized as a military district. The area of the entire Libyan territory is 680,000 square miles. Most of the country's inhabitants—1,060,922 (1949 est.)—are Arabs, Berbers, and Jews.

Italy supplied the territory with thousands of settlers and vast sums of money for irrigation, buildings, roads, harbors, farm implements, and work animals. The ports of Tripoli (128,714) and Bengasi (49,727), the two largest cities, were greatly improved. A naval base was established at Tobruch, which has one of the finest natural harbors on the North African coast. Bardia was made a modern town, with a good port. A paved highway was built the entire length of the coast. Other roads were extended south to the chief oases. Airports dotted the land. In World War II, Libya suffered heavy bombardment. After the war Britain administered it. In 1949 the United Nations began to prepare it for self-rule. The independent kingdom of Libya, created in 1951, included Tripolitania, Cyrenaica, and the Fezzan. Idris I was king. Bengasi and Tripoli became joint capitals. Britain and America kept bases in Libya. In 1953 it joined the Arab League.

Ancient Libya, a Granary of Rome

The ruins of several great ancient cities have been uncovered along the coast. Chief of these is Leptis Magna, which was one of the most beautiful of the Roman colonial cities under the Emperor Septimius Severus (see Archeology). Leptis Magna, together

A HERD OF CAMELS IN AN OASIS



Fertile oases covered with date palms offer rest and refreshment for the camels which are the chief means of transportation throughout most of Libya.

with the neighboring Sabrata and Oea (modern Tripoli), gave the country the name of Tripoli, meaning "Three Cities."

Cyrene was founded by the Greeks in the 7th century B.C., when, geographers believe, the region enjoyed considerably more rainfall than it receives today. The region was called Cyrenaica, and it became one of the great centers of Greek culture. Here the sage Aristippus founded the Cyrenaic school of philosophy, which held that "pleasure, tempered by intelligence," was the chief goal of life. At the height of its power Cyrene was a city of 100,000 inhabitants. Its splendid marble temples, baths, and cemeteries, ornamented with beautiful sculptures, have been recovered from the sands by the labors of archeologists.

Both Cyrenaica and Tripolitania passed under Egyptian rule in the 4th century B.C. and later fell to Rome. Roman Libya grew wheat enough for a large population and also exported a large amount to Rome. In the 5th century of our era Tripolitania and Cyrenaica were conquered by the Vandals, and two centuries later the country was overrun by the Arabs.

During this time the climate was becoming drier, and it attained its present state during the late Middle Ages. In 1510 Ferdinand, king of Spain, captured the city of Tripoli, and from 1530 to 1551 it was occupied by the Knights of St. John. Then the Turks seized the region and made it a pirate stronghold. In 1801 the United States fought a war with the Tripoli pirate chiefs (see Decatur, Stephen). In 1835 Turkey took firmer grip on the country, but periodic revolts continued to disturb the land until the war with Italy put an end to the Sultan's rule in 1912.

MAIN STREET OF TRIPOLI, CITY IN LIBYA

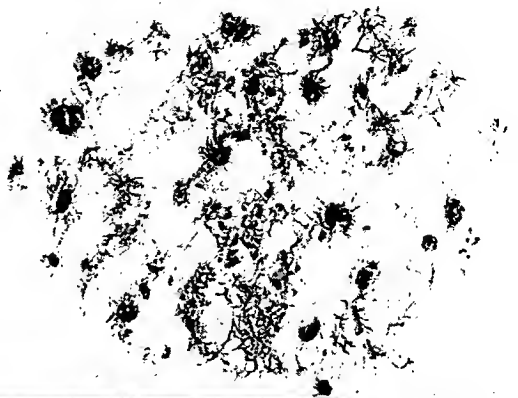


This modern city, built during Italian rule, adjoins the native city which was founded 3,000 years ago as Oea, capital of a Phoenician colony.

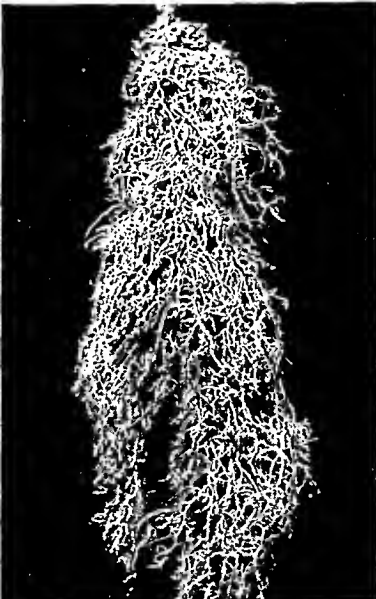
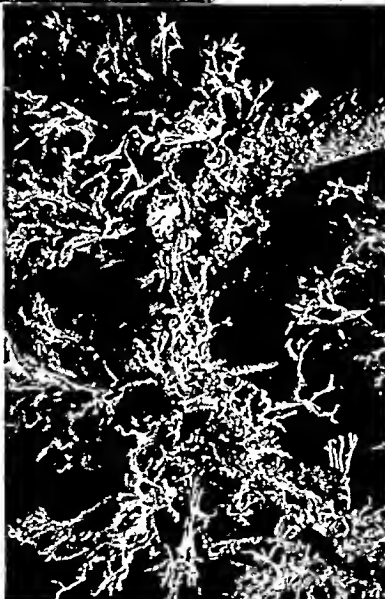
LICHENS (*li'kēns*). On tree trunks, rocks, old boards, etc., and also on the ground we often see those queer splotches of various-colored plant life which we call "lichens." They are of great scientific interest from the fact that they are not single plants, but

unable to make food for itself owing to its lack of green coloring matter, uses the food made by the alga; while on the other hand the alga is protected from drying out by living on the sponge-like network of the fungus threads. There are others who

PLANTS THAT FORM "PARTNERSHIPS"



each lichen is formed of a fungus and an alga living together so intimately as to appear like a single plant. The lichens furnish one of the best illustrations of symbiosis ("living together"), as the scientists call this intimate relation of two different kinds of organisms. The fungus makes the bulk of the body with its interwoven threads, and in the meshes of the threads live the algae. The special fungi which take part in this arrangement are almost never found growing separately,



Here are four specimens of lichens, those curious "partnership" plants, each of which consists of a fungus and an alga. It is a peculiarity of the fungi, that, having no green coloring matter (chlorophyll), they are unable to manufacture their own food. So certain ones of them combine with the algae, which have the food-making power. In return the fungi shelter the algae and gather moisture for the partnership.

but the algae are found growing free.

Lichens have a peculiar and effective method of propagation. Upon the surface of the body there are commonly seen minute granules which give the body a dusty appearance. These granules (called *soredia*) each consist of a few cells of the alga surrounded by threads of the fungus. When these soredia are blown off they start new lichen bodies.

By many it is thought that the fungus and the alga are mutually helpful in this intimate relationship (*mutualism*). The claim is that the fungus, being

believe that this is a case in which the alga is not benefited by the presence of the fungus, but is held in slavery by it (*helotism*).

In any event the combination produces a structure which is able to exist where neither one could live alone. As a consequence, lichens are able to grow in the most unfavorable places. About the last plants one finds in the far north or up on a high mountain are the lichens; and they are about

the first plants to be found upon rocks brought above the surface of the ocean. In such exposed situations the fungus could not live, because it depends upon other organisms; and the alga could not live, because it would be dried out speedily; but the two can live together. In this way lichens play a very important part in the first stages of soil formation on bare rocks.

Certain kinds of lichens, such as the ones called "Iceland moss" and "reindeer moss" are used as food by reindeer and even by man. Other kinds produce dyes, drugs, etc. (See *Algae*; *Fungi*; *Litmus*.)

LICORICE. The drops, sticks and slender "whips" which are flavored with licorice owe their taste to a plant juice. The juice comes from the long pliant roots which extend straight down into the ground for more than a yard. The plant is cultivated in the warmer parts of the Old World, especially Turkey, Russia, Italy, Iraq, the Indian Peninsula, and Spain. It takes three years to bring a licorice plantation into bearing. The United States imports its entire supply. Italy and Spain furnish the best grades.

Stick licorice is made by boiling the crushed roots and straining and concentrating the solution. Mixed with sugar it is made into cough drops, syrups, and candy. It is used also to cover the disagreeable taste in some medicines. Licorice paste, largely used in tobacco manufacture, is made from the first extract of the roots. A second extract is used in certain types of fire extinguishers. The roots remaining after extraction are used in the manufacture of box board and insulating wall board.

There are a dozen or more varieties of licorice plants. *Glycyrrhiza glabra* is the most important. They are perennial herbs, 3 or 4 feet high, with fernlike leaves and with flowers that are usually pale violet. The name comes from Greek words meaning "sweet root."

LIEBIG (lē'bīk), **BARON VON** (1803-73). Before the days of Justus von Liebig, chemistry was mainly a mass of theory, of interest only to scientists. He led in making chemistry useful in man's daily life, especially in medicine, industry, and agriculture. His work with carbon compounds laid the foundations for modern organic chemistry.

Liebig was born in Darmstadt, Germany, on May 12, 1803. He was the son of a dealer in paints. Liebig began to learn chemistry as a boy when he first watched, then helped his father improve the products of the family business. While serving as an apothecary's apprentice at 15, young Liebig read all the chemistry books he could find. Later he went to the University of Bonn, then transferred to the University of Erlangen. There he received a doctor's degree in 1822.

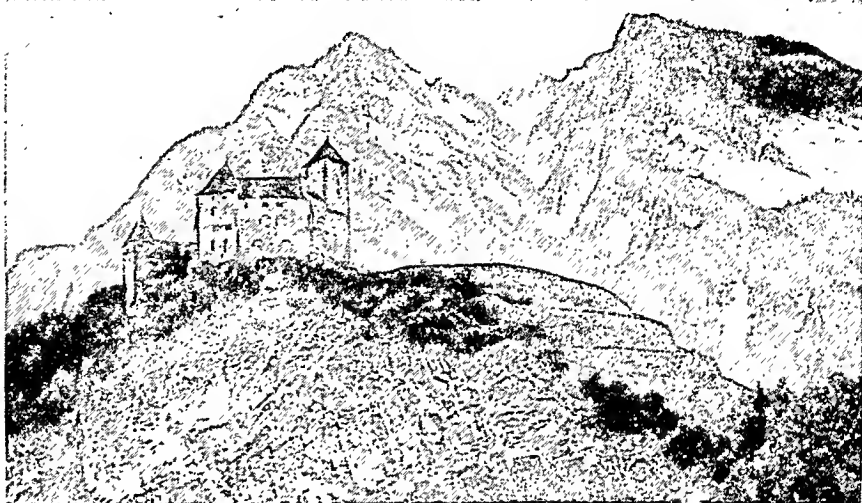
At 21 Liebig was invited to read his research report on fulminic acid to the French Academy of Sciences. The paper won praise and attention, and he gained the friendship of the scientists Alexander von Humboldt and Joseph Gay-Lussac. Liebig accepted a position at the University of Giessen in Germany. Here he set up the first experimental laboratory for college students, an important step in chemical education.

Liebig taught at Giessen until 1852, when he became a professor at the University of Munich. He died in Munich on April 18, 1873. In his own laboratory, Liebig discovered chloral and chloroform, important

additions to medicine, and aldehyde, a chemical widely used in industry. He improved methods for making potassium cyanide, used in electroplating and in making ferro cyanides. Liebig's studies of meat juices resulted in meat extracts and special baby foods. With Friedrich Wöhler he made important investigations in the benzol compounds and uric acid.

Liebig showed that the mineral and organic worlds are composed of the same elements. He showed that plants use elements from the soil for growth and pass them on to animals that eat the plants. His studies of soil led to the use of chemical fertilizers to replace minerals withdrawn by crops and to supply minerals lacking in some soils.

THE CASTLE OF THE PRINCE OF LIECHTENSTEIN



The Three Sisters Mountain towers high above the 16th-century castle of the prince of Liechtenstein. The castle itself looks down on the town of Vaduz, capital of the small principality, on the Swiss frontier.

LIECHTENSTEIN (lēk'tēn-shtān). One of the smallest independent states of Europe is Liechtenstein (62 square miles), between Switzerland and Austria. The swift-flowing Rhine forms the boundary with Switzerland. From its narrow valley the land rises eastward to rugged uplands. The people are German-speaking Roman Catholics. They raise cattle in the rich Alpine pastures and grow grain and fruit (chiefly grapes for wine) in the valleys. The capital and chief city is Vaduz; population, 2,735.

The principality dates from 1719, when it formed part of the Austrian empire. It became independent in 1866. It is now included in the Swiss customs union and uses Swiss currency. Population (1950 census), 13,757.

LIE DETECTOR. Sometimes it is hard to know when a person tells a lie. His eyes may be steady, his manner calm and sure. But except for very young children and some backward persons, most people feel guilty when they lie. Then they cannot control inward reactions, such as change in blood pressure.

A sensitive machine, however, can detect and record these hidden reactions. This instrument is popularly called a lie detector. It usually consists of an arm cuff to measure blood pressure and pulse, a

pneumograph chest tube to record the rate of breathing, and a galvanograph to measure electrically the flow of sweat in the palm of the hand. Each indicator moves a pen that marks paper on a revolving cylinder. The pen lines thus make a graph of the person's hidden bodily reactions. That is why the machine is sometimes called a *polygraph* (from Greek terms meaning "many pictures").

Lie detectors are widely used in crime detection. They are also used in business, chiefly to test the honesty of applicants for responsible positions, especially those involving the handling of money. After attaching the machine, a trained operator asks a series of questions. To each, the person answers only "yes," or "no." The operator mingles harmless queries that anyone can answer truthfully with questions that are critical. For example, he may first ask, "Did you have breakfast today?" Then, "Did you steal the money?" The sharp rise and fall in the graph lines indicate which answers are true and which are false.

The tests may not definitely prove guilt, but they often lead to signed confessions. In many states a lie detector operator may testify as a court witness. He may also be called upon to clear innocent people.

Efforts to detect lies are not new. In ancient times the Chinese, for

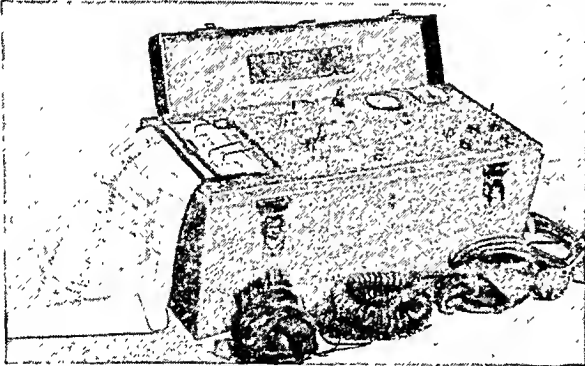
River, on which Liège is situated, make it the chief manufacturing center of Belgium. Smoke from the factory chimneys hangs over the roofs of the "Belgian Birmingham," as Liège is sometimes called. Like its English namesake it is famous for the manufacture of cannon and firearms of every kind. It also makes steam engines, machinery, hardware, and textiles. Amid the modern factories, an ancient university and many stately buildings of old and beautiful architecture recall the earlier days of Liège.

The history of Liège (German "Lüttich") goes back to St. Monulph, who traveled through the Meuse Valley in the 6th century. Impressed with the beauty of the country, he stopped where the Ourthe and Meuse rivers meet and said, "God has chosen this

LEARNING TRUTH FROM THE LIE DETECTOR



Above, a lie detector operator asks a series of questions and checks the woman's responses on the moving graph. On her right arm is a blood pressure cuff; about her chest is a pneumograph chest tube; and on her left hand are electrodes for the galvanograph. At the left is a portable model of another type of polygraph.



example, used the "saliva test." They forced a suspect to chew dry rice, then spit it out. If he spit dry rice, the Chinese said that his feeling of guilt had dried his salivary glands. In modern times scientists applied medical knowledge to the problem. Improvements in the mechanical operation of the instrument gradually brought better test results. Among those chiefly responsible for the lie detector in its present form were Dr. W. M. Marston, J. H. Larson, and Leonarde Keeler.

LIÈGE (*lî-âzh'*), BELGIUM. Even in the Middle Ages Liège was one of the arsenals of Europe. Knights were supplied with lances and armor from its smithies. A popular motto, "Faithful as a dagger of Liège," indicates the sound craftsmanship of its workers. Today the rich coal mines in the valley of the Meuse

place for the salvation of many people. Here must be raised a great town." The chapel he built was the start of the present city. From its beginnings until 1795, the city was ruled by bishops. For many centuries the "Prince-Bishops of Liège" sat in the diets of the Holy Roman Empire. The city was famous as a center of religion and learning long before its mineral wealth was discovered. In 1467 while Burgundian dukes were ruling the Netherlands, Charles the Bold sacked the city and razed its walls in punishment for a rebellion.

The completion of the Albert Canal in 1939 gave Liège a water route to the sea. Ringed by forts, the city guards the Meuse Valley route through Belgium into France. In the first major battle of the first World War, Liège fell after a heroic defense (see World War, First). It was seized again by the Germans in 1940 during the second World War and was held until the Allies liberated it in 1944. Allied bombs and later German rocket bombs destroyed much of the city. Population (1947 census), 150,203

The FORCES and ACTIVITIES That Make Up LIFE

LIFE. Living things include plants and animals of the land, creatures of lakes, rivers, and seas, and the billions of tiny microbes that dwell in both water and soil. These various plants, animals, and microbes are very different from one another. Yet all of them have one thing in common: they are *alive*.

What do we mean by being "alive"? Anyone can think of such functions of living as *eating* and *growing*. But will *all* the tests apply to *every* living thing without exception? And will every nonliving thing fail to meet the tests?

The pictures on this page raise some of these questions. They show, for example, that the test of motion is not easy to apply. Many nonliving things move, and many living things never seem to move. So if motion is a test of being alive, it must be motion of a *certain kind*. We must be able to find this *kind* of motion in moss and other plants that never seem to move. And we must be able to say that this kind of motion cannot be found in nonliving things. The same is true of other requirements for life, like growing. They must be found in all living things, but not in any nonliving things.

Tests of Life in Animals

A good way to find answers to questions about life is to study some common animals, such as dogs. We find that dogs move constantly even when asleep. They also respond to their surroundings. They may dodge when we try to catch them, but they come when we offer them food.

Dogs use food in many ways. Young ones use it to grow. When they are older they use it to repair worn-out parts of their bodies. Dogs also get energy from food. They use this energy when they run, play, eat, and even while they sleep. Finally, dogs mate and reproduce, which means that they have young ones. These young ones in turn will grow, mate, and reproduce. Thus they keep the race of dogs alive.

Tests of Life in Plants

All these facts help to tell us that dogs are alive. Will these same tests apply to plants as well?

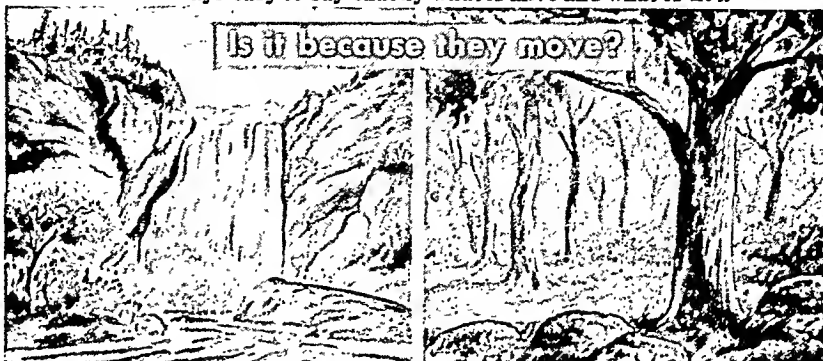
Plants do not try to move or dodge when we touch them (except for the "sensitive" plants). But they do change position as they grow. A

tree places its branches and leaves to get sunlight. If a plant starts to grow in a dark spot, it will turn its stem to reach the light. Plants also turn their roots to reach water and minerals in the soil.

Plants therefore move in ways *that are useful to them*, just as animals do. This is the kind of motion

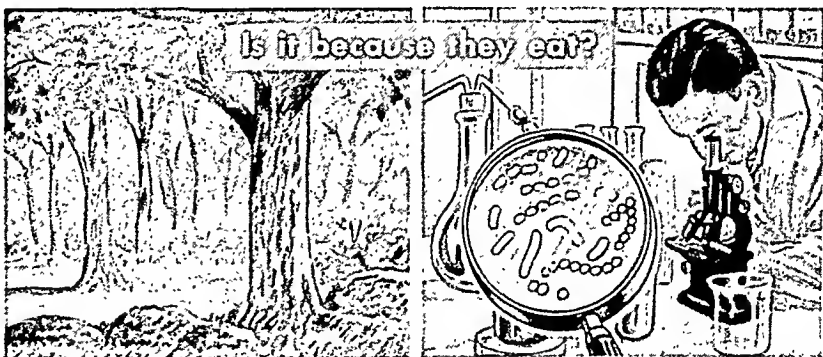
WHAT MAKES PLANTS AND ANIMALS "ALIVE"?

The pictures below raise questions about the differences between living creatures and nonliving objects. They show that it is not always easy to say exactly what is alive and what is not.



It is easy to say that dogs, cats, and many other animals are alive because they move. But many lifeless things like water and clouds in the sky also move. So movement is not a simple test for life.

Another question about movement is raised by a tree. It is alive, but it never moves unless a wind stirs its leaves and branches. Moss growing on a stone is alive. But it never seems to move at all.



Everyone knows that wild animals spend much of their time eating. But if eating is a test of being alive, what about a tree? It is alive, but does it eat? And how does moss on a stone get its food?

Scientists are sure that microbes are alive. But if microbes must eat to live, how do they do so? Plainly, an animal's way of eating with its mouth is not the only way. But what are the other ways?



Both animals and plants grow, and so ability to grow may seem to be a good test of being alive. But many lifeless substances become larger and take on won-

derful shapes. When water freezes in a cloud, it forms the beautiful crystals we call snowflakes. Frost on a windowpane can make shapes like plants in a garden.

These pictures and questions show that many "easy" tests of being alive are not so easy, after all. The real tests of being alive are explained in the article.

that marks living things. Nonliving things move if an outside force compels them to. They do not have forces which are part of their inner being, and which make them move in ways that are useful to them.

How Plants Get Food and Reproduce

Although plants do not eat, they secure food and use it. Those we know best take water, nitrogen, and minerals from the soil, and a gas called carbon dioxide from the air. They use these materials to make the foods they need for growth and energy. They also make some foods which can be stored for later use.

Plants reproduce, or make young ones, in a number of ways. Many kinds have seeds which grow into new plants. Others are able to grow from roots, pieces of stem, or bulbs. Some kinds even reproduce by means of leaves which grow into new plants when they fall on moist, rich ground.

Thus plants resemble animals in these activities as well as in motion; and again the activities show the same great tendency toward *being useful* to the plant or its race. These same tests will hold true in smaller and stranger forms of life.

How Microbes Live

"Microbes" is our name for all living things which are too small to be seen clearly with our eyes alone. Greatly enlarged pictures taken through microscopes tell us what they do. These pictures show that many microbes swim, while others creep or twist to and fro. All respond to conditions around them by going toward things that are good for them and protecting themselves from things that are not. They also get food in many ways. Many capture other tiny creatures, but some make food as large plants do. Other microbes, called germs of decay and disease, get their food from dead or living plants and animals.

We know that microbes use food when they move about, and we can see that they grow. When they become full grown they reproduce, becoming two or more new microbes. Some kinds do this several times a day.

Seven Functions of Living

Thus animals, plants, and microbes have shown that all of them are able to do certain things. These "doings" are called *functions of living*, and they are the tests of being alive. Here are seven of them:

1. *Movement.* All living things move *without outside help*. This makes them very different from a stone that is thrown, a stream that runs downhill, or an engine which has to be started. No outside force has to help start the movements of a plant, a dog, a fish, or a microbe.

2. *Irritability.* This means that living things respond to conditions around them. Green plants, for example, grow toward sunshine. Certain microbes shrink into tiny balls when something touches them. Human beings show this kind of irritability by blinking when light shines into their eyes or by running to catch a ball.

3. *Feeding.* All living things secure food. Some bite, some suck, and some soak up food through membranes ("skins") that cover their bodies. Green plants make food from water, gas, nitrogen, and minerals.

4. *Nutrition.* This is our name for all the processes by which food is used. Some food is turned into living material, bones, teeth, or wood. Some is used to provide the energy which all living things need to keep going. We may compare this to the process in which an engine burns oil or coal and gets energy to move a train. But no engine can use coal or oil to make itself larger or mend worn-out parts, as living things do with their food.

5. *Growth.* We sometimes say that snowballs grow when we roll them over and over, or that salt crystals grow in salty water as it evaporates. Actually, these lifeless objects only become larger. Living things grow by making new parts and changing old ones. This happens when a seed grows into a large plant or a chick grows into a hen. Growing human beings add new parts, such as teeth, to their bodies and change the proportions of other parts as they grow.

A special kind of growth heals injuries and replaces worn parts. Shrubs and trees mend injuries by covering them with bark and adding new layers of wood. Crabs grow new legs when old ones are lost. Human beings can heal cut skin, mend broken bones, and repair soft parts of their bodies that wear out or are damaged by disease. In this way they are able to live for many years.

6. *Reproduction.* When living things reproduce, they make new living things. This is true even of simple microbes which reproduce by dividing into two sections. Each section is able to move, feed, grow, and perform the other functions of living. In time it also will reproduce and make two new microbes.

7. *Excretion.* This means getting rid of waste materials. Much waste comes from food; the rest is produced by movement, growth, and other functions of living. If this waste remained in living things, it would soon cause illness and death. But living things can get rid of waste, so it seldom does harm.

Common lifeless things, such as stones and machines, cannot carry on these functions of living. Some lifeless models have been made to perform *some* of the functions of living. But models are unable to carry on *all* the functions which every living thing must perform to keep on living. For this reason, we know that they are not alive.

Living Material, Called Protoplasm

Since all living things perform these seven essential functions of life, the urge to do so must come from something within them. The question is, what this "something" may be. Do living things contain some special substance that is not found in lifeless things? If they do, how does this substance form microbes, animals, and plants?

We find part of the answers to these questions in a creature known as *amoeba*, which lives in shallow ponds. To our eyes it looks like a milky speck, but a microscope shows it to be a lump of jelly. This jelly, called *protoplasm*, is the substance which makes up all living things.

When we watch an amoeba closely through a microscope, we see that its protoplasm moves and changes.

It streams through the tiny body, especially when the creature changes shape. At one time the living jelly is clear; then it becomes gray and grainy or seems to fill itself with bubbles or droplets. A clear stiff network may appear too. Its threads are rather like tiny crystals of mineral matter. It serves as a support or framework for bubbles, droplets, and thin, watery parts of the jelly.

This complex mixture moves and changes according to conditions inside the amoeba as well as to conditions around it. The mixture also takes in food, uses it, grows, and finally reproduces. The protoplasm which forms an amoeba also makes the little creature live.

Cells Form Living Things

Although protoplasm is living material, the amoeba is not just a simple lump of protoplasm. It is protoplasm in the form of one definite body called a *cell* (see Cell).

Several parts fit together, or are organized, in the amoeba's cell. Its surface is a clear, tough membrane which covers and protects a thinner, darker-looking *cytoplasm* inside. The membrane is flexible and permits the amoeba to change shape. By doing so the amoeba can move to get food.

The amoeba shows *irritability* by these movements. It feeds and also excretes waste material by forming little droplets called *vacuoles* in its protoplasm. As it absorbs food, it grows.

All these activities seem to be controlled by a round structure called the *nucleus*. The nucleus also performs the function of reproduction. In due time it divides, and each half takes its share of the cytoplasm. The two halves of the old amoeba become two new amoebas.

Life in a

Single-Celled Plant

Another example of life in the form of a single cell may be seen in the tiny green plant known as *Protococcus*. Layers of these plants form green scum on damp trees, rocks, and brick walls.

Each *Protococcus* cell contains bubbly, grainy, or foamy protoplasm, a nucleus, and a thin membrane. The nucleus controls the life of the cell and in the course of time divides for reproduction, like the

nucleus of the amoeba. Otherwise the life of *Protococcus* is very different from that of an amoeba.

Inside the cell is a large structure filled with grains of a green substance termed *chlorophyll*. These grains make food for the plant from water and carbon dioxide. Since the plant can make food in this way,

it does not have to move about like an amoeba. Therefore it can have (as it does) a stiff, protecting coat, or wall, made of a transparent substance called *cellulose*.

These two substances, chlorophyll and cellulose, make plant life quite different from animal life. With them a plant can stay in one place and make its food inside its colorless wall. Since animals do not have chlorophyll, they must get food from other living things or from dead material. To do this

they have to move, which means that at least some of their cells must be covered with soft, flexible membrane. In one-celled creatures such as the amoeba, the whole tiny body moves freely.

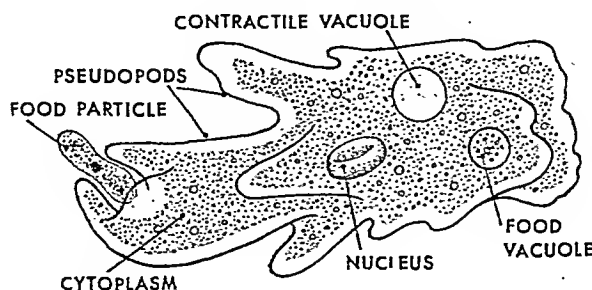
Simple and Complex Cells

There are many kinds of one-celled plants and animals related to the amoeba. Some one-celled creatures look like slippers, vases, or balls, and have more than one nucleus. Many swim by waving lashes; others use hairlike structures. One kind has two nuclei, a mouth, and a ring of moving "hairs" that bring in food. It also has a stalk that can stretch or coil up and pull the creature away from danger.

All these parts are organized, which means that they fit and work together. For this reason, we often call living things *organisms*. However, not all organisms have as many parts as the ones already described. Many microbes have no separate nuclei, and their food-making chlorophyll is scattered through the cell. Other

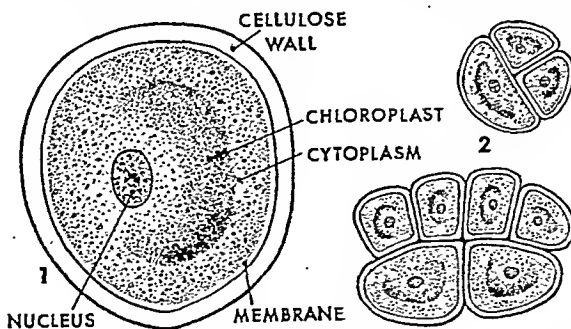
microbes, called *bacteria*, have neither nuclei nor green grains. They get their food from other organisms or from dead material. Bacteria once were said to be the simplest organisms. Then *viruses* and *bacteriophages* were discovered. Bacteriophages are tiny things that kill bacteria. Viruses include the germs that cause colds, yellow

A ONE-CELLED ANIMAL THAT HUNTS FOOD



This curiously shaped creature is an amoeba, enlarged about 125 times. It consists of a single cell which crawls and catches food by stretching out "false feet" (pseudopods) and flowing into them. When a pseudopod touches a particle of food, the creature first flows around it. As soon as the particle is surrounded, a bubble-like food vacuole appears and in it the food is digested. The contractile vacuole absorbs excess water produced as food is used and squeezes it out of the cell. The nucleus controls the life of the amoeba, as explained in the article.

A ONE-CELLED PLANT THAT MAKES FOOD



1. This one-celled plant called *Protococcus* is shown enlarged about 100 times. Inside it is a large structure called the *chloroplast*, which contains *chlorophyll*. The chlorophyll uses energy from sunlight to make food from carbon dioxide and water. The cell is protected by a stiff outer wall of cellulose. 2. Two or more *Protococcus* cells often join together and form a clump. Thousands of millions of them form green scum on mud or moist rocks and trees.

fever, and other diseases of animals and plants. Even the largest viruses are too small to be cells, and they seem unable to grow or reproduce unless they are in animals or plants. Some scientists think both viruses and bacteriophages are almost, but not quite, alive. Others think they are living things that have degenerated, losing most of their parts. The remaining substance gets along by taking material from the organisms in which the viruses live.

Larger Organisms Contain Many Cells

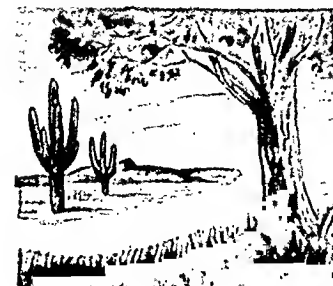
The common plants and animals we know are much larger than viruses and microbes. They also are too big to be formed by a single cell. They therefore are made of many cells that live and work together.

Some of the simplest many-celled organisms are plants that live in ponds and streams. Each plant consists of a chain of cells that drifts to and fro in the water. Most cells in the chain are alike, but the one at the bottom (called a "holdfast") is different. It is long and tough, and its base holds to rocks or pieces of wood. This strong cell keeps the plant from floating away.

Sea lettuce also has a holdfast, but the rest of the plant contains boxlike cells arranged in two layers. These layers are covered and protected by two sheets of clear cellulose that is very tough.

Trees, weeds, and other familiar land plants contain many more cells than sea lettuce and are much more complex. Their cells form organs such as roots, stems, leaves, and flowers. Millions or billions of individual cells are needed to form these complex plants.

No animals consist of chains of cells or of cells arranged in two flat layers like the sea lettuce. But the body of a pond-dwelling creature called *Hydra* has two layers of cells arranged in a tube. The bottom of the tube is closed, but its top contains a mouth.



Slender branches of the tube form tentacles that catch food and put it into the mouth.

Great numbers of cells of many kinds form the bodies of such creatures as insects, fish, and horses. Similar cells that work together make up *tissues*, and tissues that work together form *organs*. A dog's leg, for example, is an organ composed of bone tissue, muscle tissue, nerve tissue, and covering tissue. These are nourished by a fifth kind of tissue, the blood. Although each serves its own purpose, all five tissues work together when the dog moves its leg.

Parts and Cells Are Controlled

Varied parts and cells work together because they are controlled. In plants, control is carried out by chemical particles called *hormones*, which go directly from cell to cell or are carried about in sap. When something touches a sensitive plant, for instance, the touched cells produce a hormone that goes to countless other cells and makes them lose water and collapse. As cell after cell does this, leaves begin to

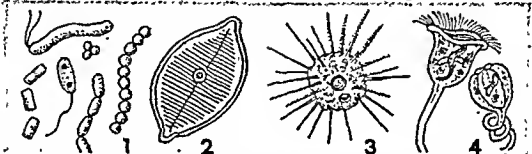
droop. They will not spread out again till the effect of the hormones is lost.

In many-celled animals, hormones regulate growth, keep muscles in good condition, and perform many similar tasks. Other types of control are carried out by nerve cells, which carry impulses to and from various parts of the body. These impulses tell when things are seen, felt, or heard. They also make muscle cells contract or relax, so that animals run, lie down, catch food, and do countless other things. Nerve cells may even deliver the impulses that cause other cells to produce hormones.

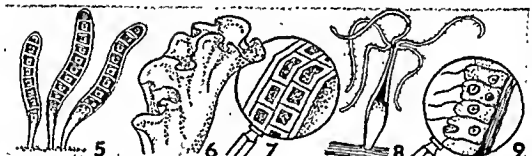
Living Things Are Specialized

In both the amoeba and *Protococcus* all parts of the protoplasm—other than structures such as the nucleus—are much alike and can do almost anything. This is

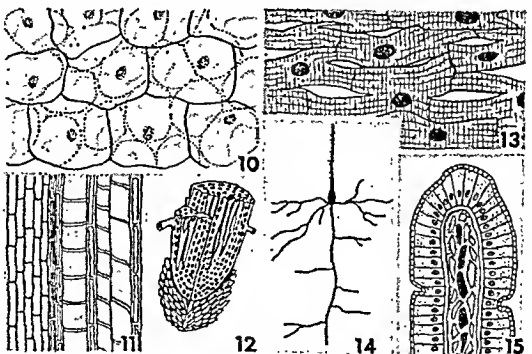
LIVING THINGS ARE MADE OF CELLS



The simplest living things are single cells of microscopic size. Examples are (1) various bacteria and (2) a diatom, a one-celled plant in a glassy shell. Examples of animals are (3) a heliozoan, with long, stiff pseudopods, and (4) a vorticella. This creature has a stalk that coils and contracts, drawing it away from danger.



The plant called *Ulothrix* (5) has its cells joined end to end in a chain. Sea lettuce (6) has cells in two layers, which are shown in a microscopic view (7). The tubelike little animal *Hydra* (8) also has two layers of cells, as shown in the enlarged view of one of its tentacles (9).



Higher plants (left) have specialized kinds of cells. Some leaf cells (10) have chlorophyll for making food. Stems have stiffening cells (11), and roots have cells that take in water and minerals (12). This array of cells enables a plant to take root and make food without having to move about.

Higher animals (right) also have specialized cells, but cannot make food from lifeless materials as green-plant cells do. Animals must secure ready-made foods and use them. Some cells that help in doing so are muscle cells (13), nerve cells (14), and cells which absorb food after it has been digested (15).



not true of one-celled creatures that have lashes, hairs, and other definite parts. The lashes or hairs are used in swimming or in setting up currents that bring food. But the food is swallowed through a mouth and is digested in droplets that stay in the bubbly body. Special fibers that seem to work like nerves control the hairs and lashes. Several one-celled organisms even possess "eyespot" that are affected by light.

These structures are *specialized*. Each one does its own part in the work of living. Many-celled organisms have tissues and organs that are still more specialized. Roots, leaves, flowers, eyes, and brains are examples of organs that do specialized work.

Specialization is carried from parts to entire living things. Cactus plants, for example, can live well only in dry regions, but cattails must grow in wet places. Herring swim near the surface of the sea, but the deep-sea angler fish lives on the ocean bottom and lies in wait for food. Certain caterpillars eat only one kind of leaf. They starve if they cannot get those particular leaves.

This specialization of whole organisms is called *adaptation*. Every living thing is adapted to its surroundings—to the sea, fresh water, land, or even to living in other organisms. During the ages since life began, organisms have become adapted to all sorts of conditions and to all sorts of tasks. Today there are millions of different combinations between organisms and surroundings. With the possible exception of bacteriophages and viruses, however, all the different organisms consist of protoplasm that is organized into cells. Cells are the "building blocks" of the living world.

The Elements in Protoplasm

Since protoplasm differs from lifeless materials, people once thought it contained "principles" not to be found in the earth. It is now known that both the earth and protoplasm consist of simple substances called *chemical elements*. These elements may exist alone, as the element carbon does in coal. Generally, however, elements combine into compounds, which may be very complex. Chemists who have studied the compounds in living things have found:

First, that protoplasm contains only elements that are common in the earth.

Second, that only a dozen elements are found in *all* kinds of protoplasm. The most important of these "universal" elements are carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur, magnesium, and iron.

Third, that different varieties of protoplasm contain other elements, such as copper, zinc, and chlorine.

These are also plentiful in the earth, which is where plants get them for use in protoplasm. Animals get them by eating plants or other animals.

Atoms in Living Molecules

When elements form compounds, tiny particles called atoms combine and build up molecules. The molecules in protoplasm are extremely complex. A molecule of the substance that makes a horse's blood

red contains 2,359 atoms of six different elements. The red material in our own blood contains about the same number of atoms.

The complexity is made possible by carbon, which may be called the "framework" element. It links atoms of different kinds in various proportions and arrangements. Carbon atoms also join with each other in long chains, rings, and other arrays.

Oxygen and hydrogen are most important in using energy, while nitrogen enables living things to vary and become specialized. Large amounts of nitrogen are found in protein, or "body-building" compounds. Nitrogen also is used in wood and in the substance called chitin, which forms the shells of crustaceans, insects, jointed worms, and related creatures.

How Plants Obtain Food

All living things get food in one of two ways. They make it or they get it ready-made. The one-celled plant, *Protococcus*, uses both methods. It combines water, carbon, and mineral matter dissolved in the water by the process called *photosynthesis*. The process requires energy, but the green chlorophyll grains can obtain this from sunlight. After several steps which are not well understood, the food-making process results in a kind of sugar called *glucose*.

Protococcus may use glucose molecules almost as fast as it makes them.

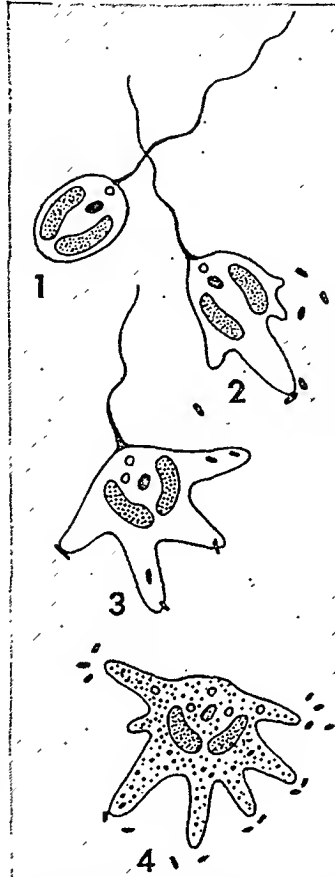
It also may turn them into starch or droplets of oil, which it stores for use when it cannot get sunlight. Finally, *Protococcus* may combine atoms from glucose with some ready-made food combinations in the dissolved minerals. In this way it builds up protoplasm and cellulose.

Many-celled plants also get ready-made foods and make glucose. In doing so, however, they use many different cells, tissues, and organs, such as leaves, roots, and sap-carrying channels in the stem.

How Animals Change Food

Although many animals are green, no true animal contains grains of chlorophyll. Therefore no true animal can make food from carbon dioxide and water. This means that animals must get ready-made food from plants or other animals.

A DOUBLE LIFE

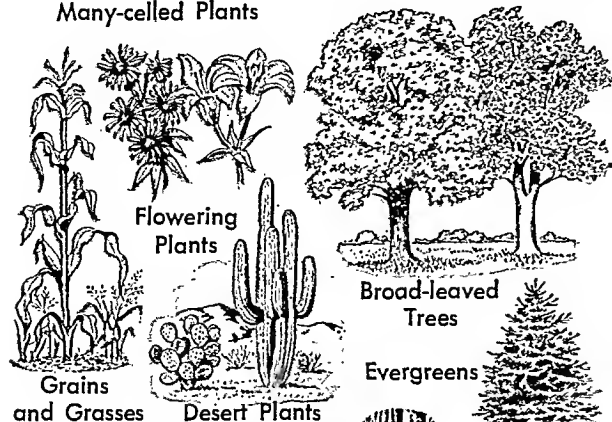


In its ordinary form, single-celled *Chrycamoeba* swims with a long lash and makes food with its two large chloroplasts (1). But at times it puts out pseudopods and even absorbs its lash (2, 3, 4). It then moves about, captures food, and digests it just as an amoeba does.

THERE MAY BE FOUR KINGDOMS OF LIVING THINGS

PLANT KINGDOM

Many-celled Plants



Animals, however, can change foods after they are eaten. When a horse eats more grain than it can use, it turns the extra grain into fat and stores the fat in tissues. Animals can turn sugary food into animal starch (*glycogen*) and store it in the liver, ready for use when needed.

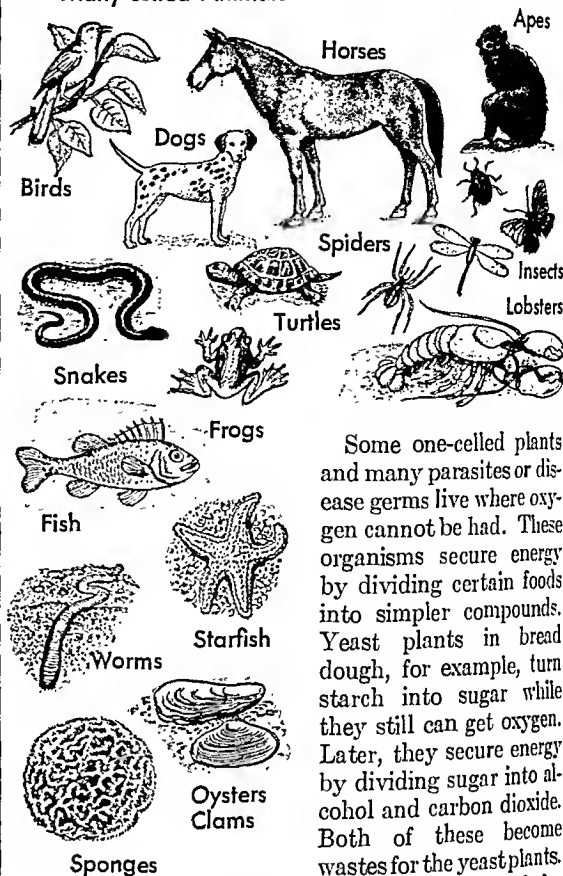
Securing Energy from Food

When plants make glucose from water and carbon dioxide, they subtract some atoms of oxygen from the combined materials. More oxygen is lost when glucose is turned into common sugar, starch, fat, or other food substances; and as oxygen is lost, more and more energy is stored in the made-over molecules.

When energy is needed for living, the process must be reversed. Food is first digested (dissolved in liquid). Then oxygen is combined with food molecules. They are changed into simpler substances and give up energy. This process is called *oxidation*. If oxidation is complete, the food becomes water and carbon dioxide again and gives up all its stored energy. Part of this energy is lost but most of it remains in protoplasm to be used in the work of living.

ANIMAL KINGDOM

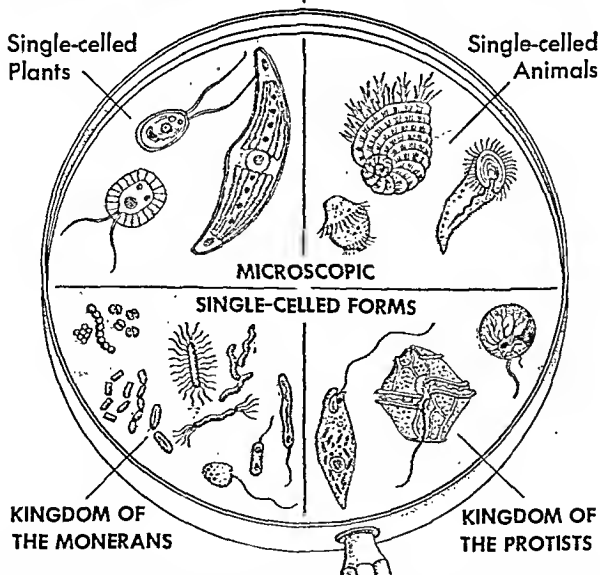
Many-celled Animals



Some one-celled plants and many parasites or disease germs live where oxygen cannot be had. These organisms secure energy by dividing certain foods into simpler compounds. Yeast plants in bread dough, for example, turn starch into sugar while they still can get oxygen. Later, they secure energy by dividing sugar into alcohol and carbon dioxide. Both of these become wastes for the yeast plants. When yeast is used for making bread, this carbon dioxide is what makes the dough rise. The alcohol evaporates into the air as the bread is baked.

Carrying Food and Oxygen

One-celled plants such as *Protococcus* get food-making substances and energy through the cell wall. In many-celled plants, each cell also absorbs and gives out substances through its wall. But to provide what every cell needs and to carry off wastes, the plant uses a liquid called *sap*, which travels through the cells. The larger many-celled animals provide for the needs of their cells with circulating liquids called *blood* and *lymph*. Blood carries the oxygen needed to re-



For centuries men thought that all living things were either plants or animals. Today scientists believe that two or more other kingdoms may exist, as the article explains. Some microscopic forms of all four kingdoms are shown under the magnifying glass. The single-celled plants are green algae (with twin lashes) and a desmid. The single-celled animals are two "hairy" (ciliate) protozoans and a larger-shelled protozoan. The monerans are various common bacteria and purple bacteria (with single lashes). The protists shown are flagellates, including the fish-shaped *Euglena*.

lease energy from food and it carries away the carbon dioxide and water that are produced as wastes.

Kingdoms of Living Things

Many more than a million kinds of organisms are now known. For centuries scientists divided them between two kingdoms, plants and animals. According to this system of classification, most members of the plant kingdom have chlorophyll and possess cellulose. Those that have no chlorophyll are supposed to be descended from organisms that lost it long ago. The animal kingdom, however, consists of creatures that have never possessed either chlorophyll or cellulose.

These two kingdoms seemed to include all living things until scientists examined large numbers of one-celled organisms. They found some that seemed to fit neither kingdom and others that seemed to fit both. Bacteria, for example, are too simple to be animals; yet they contain no true cellulose and may never have had chlorophyll. Some organisms swim, crawl, and even capture food like animals, but contain chlorophyll. Others are also covered with plates of cellulose.

Such "in-betweens" have been called plants by botanists and animals by zoologists. More and more, however, scientists are deciding that these puzzling organisms require a new system of classification. The simplest system that has been proposed divides living things among four kingdoms:

Kingdom 1—Monerans. These are one-celled organisms that have no distinct nuclei. They belong to two subkingdoms, the bacteria and the blue-green algae.

One important group of bacteria are purple and swim by means of lashes. Greenish particles in these purple bacteria can make food from carbon dioxide and water but are not true chlorophyll. Blue-green algae have no swimming lashes and often live together in chains or clumps covered by jelly. They contain true chlorophyll and can make food, but they also can soak up ready-made food as many bacteria do.

Kingdom 2—Protists. Some scientists say that the only protists are the things that have been called both plants and animals. They are one-celled and have definite nuclei. They swim by means of lashes that whip to and fro; they act like animals, and may catch other organisms and eat them. In spite of this, they have chlorophyll and can make glucose, as plants and the purple bacteria do.

Other scientists say that the protists include one-celled creatures such as amoebas, which generally are called protozoans, or "first animals." Still others include sponges, seaweeds, and even fungi, such as mushrooms. But it seems best to confine the kingdom of protists to one-celled creatures or even to "in-betweens" alone.

Kingdom 3—Plants. Plants probably began as one-celled organisms with nuclei, chlorophyll, and two lashes that were used for swimming. Some plants still drift or swim about, but the others have settled down. Although some of these attached ("sessile") plants are one-celled, most of them have great numbers of cells. Plants such as fungi (which include mushrooms and

molds) have lost their chlorophyll and live upon other animals and plants or upon dead material.

Kingdom 4—Animals. Animals are organisms whose cells contain nuclei but no chlorophyll. Except for certain one-celled forms, they also have no cellulose. Most animals move and change shape more freely than plants. They also have other characteristics which are described in the article Animals.

This classification does not include viruses and bacteriophages. If they prove to be living things, one or two kingdoms will have to be provided for them.

LIFESAVING SERVICE. Shipwreck once meant almost certain loss of all on board. Though a storm-swept vessel might be in sight of shore when it broke against the rocks, passengers and crew had little hope of rescue. Today fewer than one per cent of those aboard ships in peril off the coast of the United States are lost. This remarkable record is due to the work of the United States Coast Guard. It rescues or assists some 9,000 persons a year.

Government lifesaving stations were first set up on the coast in 1848. The Lifesaving Service was combined with the Revenue Cutter Service in 1915 as the Coast Guard (*see* Coast Guard).

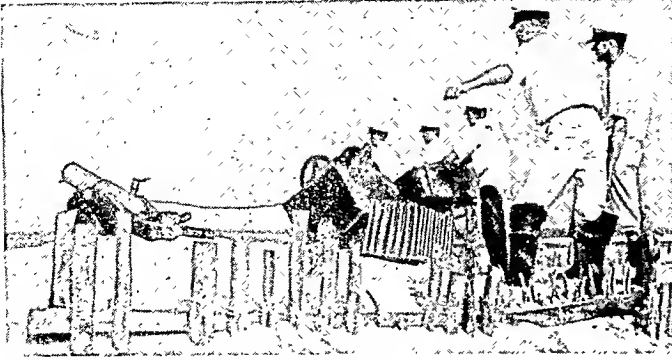
Today the Coast Guard maintains more than 200 lifesaving stations along some 10,000 miles of seacoast and the shores of the Great Lakes. They are divided into 13 districts. More than 125 stations follow the Atlantic coast and the Gulf of Mexico. Eight or ten surfmen and an officer make up a station crew. They keep a close watch of the sea from high lookout towers, and patrol the beaches at night and during stormy or foggy weather.

When a patrolman sights a ship in distress, he signals the sailors with flare rockets to show that help is coming. Word goes out by telephone, telegraph, radio, or signal light to other stations and ships to stand by in case of need. Then the officer decides how best to make the rescue. He may order the crew to set up the Lyle gun and fire a line to the vessel. This small cannon shoots a projectile carrying a light rope over the vessel. The vessel's crew uses the rope to draw out a heavy cable, and fastens it on the ship. Then apparatus rigged to the cable carries the people ashore. One man at a time may ride in the "breeches buoy"—a large life preserver with a pair of canvas trousers attached. When a life car is used, it holds six or seven persons.

At other times the Coast Guard uses special self-bailing, self-righting lifeboats. Some boats are rowed by the strong arms of the surfmen. Others are propelled by motor. Motor boats are 26 or 36 feet long. The large craft have automatic valves which empty water as fast as it is taken in. They are made buoyant by many watertight compartments.

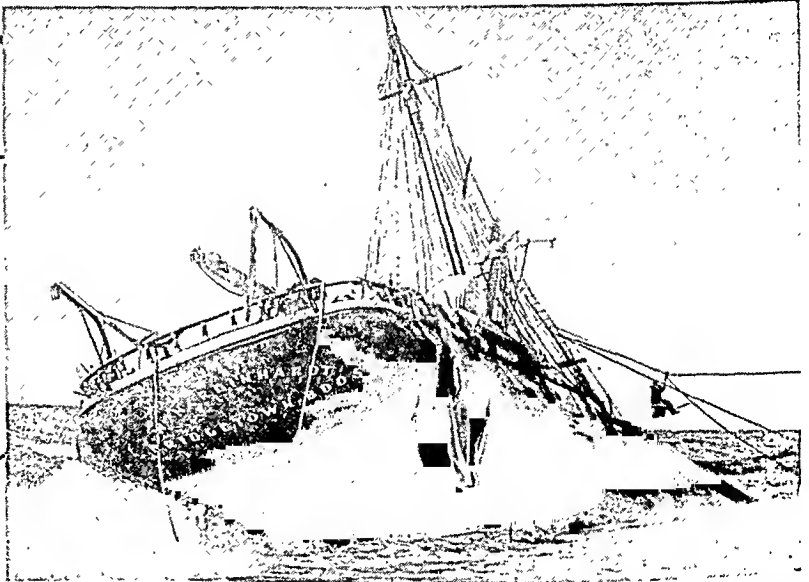
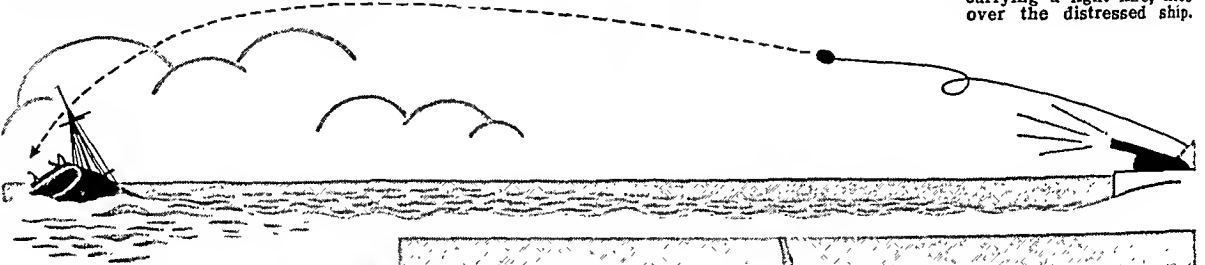
Air stations extend the patrol and rescue service of the Coast Guard far out to sea. Guardsmen in airplanes drop storm warnings to fishing vessels and other craft without radio equipment. They may place a seaplane alongside a ship to rescue survivors or to fly ill or injured men ashore. They carry serums

CHEATING THE SEA OF ITS VICTIMS



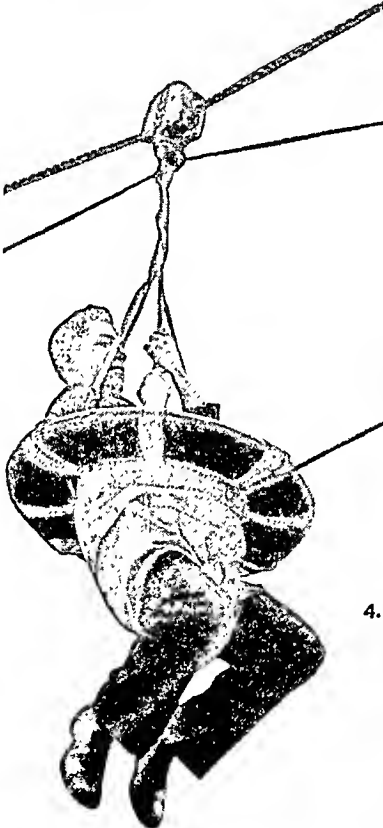
1. Coast Guardsmen firing a Lyle gun
— the cannon that saves lives.

2. The projectile from the gun, carrying a light line, flies over the distressed ship.



3. The shipwrecked crew, seizing the light line, have hauled out from shore a heavier set of cables and have fastened them to the rigging. One man is already, riding to safety in the breeches buoy.

4. A close-up of the breeches buoy, showing the pulley that travels on the cable and the lines that pull the buoy to shore and back again.

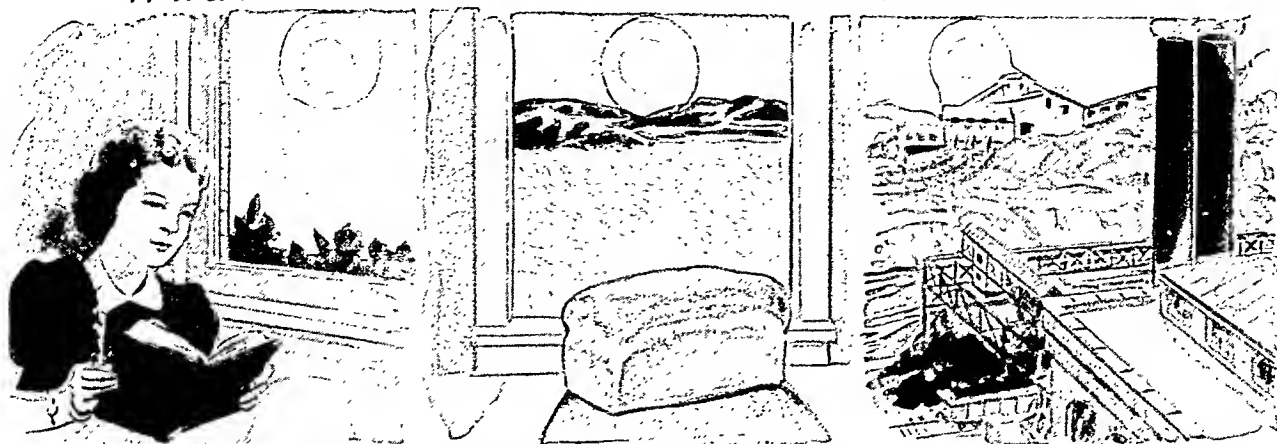


This group of pictures shows the way in which seamen can be rescued from vessels wrecked within 400 to 700 yards of the shore. The breeches-buoy method of bringing the crews of disabled ships to safety is used whenever the disaster occurs in rough shoal water, in which it is impossible to reach them with lifesaving boats. Coast Guard stations along dangerous coasts stand ready at all times to carry their portable equipment to the site of a shipwreck. The small bronze cannon used to make contact with a wrecked vessel was invented by David A. Lyle of the United States Army.

and medicines, and even physicians to sick mariners. The helicopters of the air-sea rescue service have metal litters attached to their flotation gear. When the pilot sees a raft carrying a victim of an air or sea disaster, he drops down and picks up the victim in the litter.

Although the lifesaving service in the United States and Canada is maintained by the government, in most other countries it is supported by voluntary contributions. Canada has a number of government stations under the control of the federal Department of Transport.

What SCIENTISTS Know About LIGHT



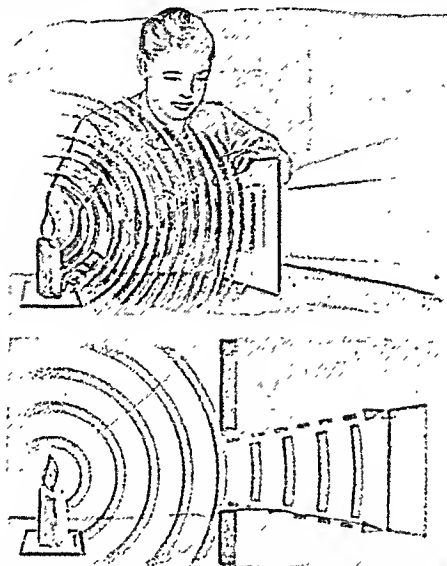
Light makes it possible for us to see the world about us and to read. We would not have bread or other food if sunlight did not provide energy for plant growth. And coal and other fuels come from plants and animals that lived long ages ago.

LIGHT. Light is supremely important because it gives us sight. With it we know what is happening at great distances—as far, in fact, “as the eye can see.” We can use light to turn night into day whenever we like. We can use it to see tiny, microscopic germs that cause disease, or to study distant stars and planets. Light even shows us what is happening on the other side of the earth. It gives us photographs and motion pictures of these distant people and places.

Helping us to see is not the only service light performs. It provides one of the sources of all life. Without light, all the green plants on earth would soon die. Through a complicated process, called photosynthesis, light helps plants use carbon dioxide for their food. Without plants, the plant-eating animals would starve. Then meat-eating animals and man would have no food. Likewise we would not have fuel for making warmth and power if we had no light. Coal was formed by the decay under pressure of ancient plants that got their food with help from light. Petroleum was formed from remains of living creatures that depended upon light for their food.

For all these reasons light is supremely important to us, and we ought to understand how it works. We can learn a great deal by looking around and by thinking clearly of what we see. For example, suppose we are in a very dark room. We open the door to another room, where an electric bulb is shining. Scientists call this bulb a *luminous source* because it gives off light.

As the door opens, light falls on objects inside our dark room. We see some of these objects clearly, because now they are *illuminated* objects. They



Suppose we shine light from a candle through a small square cut in cardboard (first picture above). We get a much larger square of light on the wall. The lower picture shows why this happens. Light travels out from any source in waves (orange lines) like ever-widening ripples in a pool. When the waves hit the cardboard they are stopped. But the waves that go through the hole continue to widen until they strike the wall.

reflect the light which falls upon them from the luminous source. Other objects at the sides of the room will still be dim. We do not see them well because they lie outside the stream of light that comes through the door.

Light Travels in Straight Lines

Our experiment with the door has taught us something about the way light travels. So far as our eyes can see, it travels in straight lines. Scientists call this method of travel the *rectilinear propagation* of light.

We can show this property of light clearly with the simple experiment on this page. As we shine the candle through the hole in the cardboard, we note how all light is cut off except the part that hits this square hole. From the hole a shaft of light spreads out and makes a lighted square on the wall beyond. The square on the wall is much wider than the

square hole in the cardboard. Next we can examine another important fact. We can find out how the illumination on a square inch of surface gradually decreases as we go farther from the source of light.

Light on a Surface

The experiment with the cardboard shows that the beam of light from the candle spreads out in all directions as it travels. We start with the amount of light energy emitted each second by the candle or other luminous source. As this light energy spreads out from the source, the amount of light that falls each second on a square inch of surface must get less and less at increasing distances from the source.

This decrease in illumination of a surface can be tested by experiments. Some simple ones are shown on the next page. The first experiment uses light from

a point source. The experimenter gets this light by letting light from a candle pass through a small hole in a piece of cardboard.

Beyond the first board he passes the light through a hole in another piece of board. This hole makes a light beam with a cross-section area of one square inch. Thereafter the light spreads out according to a simple law.

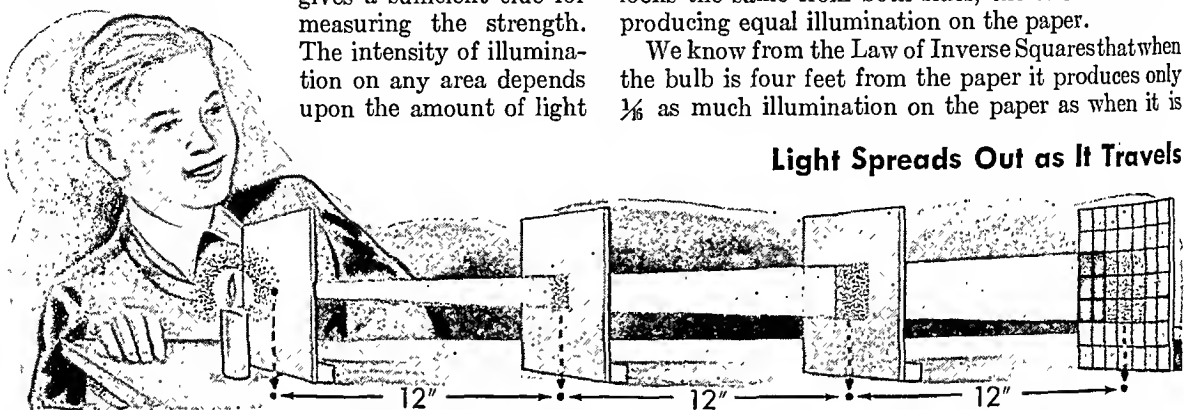
Use the space from the point source to the inch square as a measuring unit. At twice this distance, the beam covers four times the area. At *three* times the distance, it covers nine times the area. This gives a sufficient clue for measuring the strength. The intensity of illumination on any area depends upon the amount of light

given off by a spermaceti candle seven-eighths of an inch in diameter, burning 120 grains of wax an hour. (Science now uses more exactly controllable sources of light; but they match the old candle in strength.)

With this standard candle the brightness or intensity of any light source can be measured. One method is shown at the bottom of the page. The intensity of the source is compared with that of a standard candle by finding a place between the two sources where they give equal illumination. This is done by moving a paper with a grease spot on it back and forth between the two light sources. When the spot disappears, or looks the same from both sides, the two sources are producing equal illumination on the paper.

We know from the Law of Inverse Squares that when the bulb is four feet from the paper it produces only $\frac{1}{16}$ as much illumination on the paper as when it is

Light Spreads Out as It Travels



To test how light spreads out, make a small hole in a piece of cardboard. Cut a square one inch on a side in another piece. Cut out a square two inches on a side in a third piece and mark off one-inch squares on a fourth. Place the first board close to a candle and arrange the others as shown. The board with the hole gives a "point source" of light. The light spreads into a beam which is cut to one inch square by the hole in the second board. At the third board, it fills four square inches and on the fourth it covers nine square inches. The area covered is proportional to the square of the distance from the source. Light from any point source, such as a star, spreads out in exactly this same way as it travels through space.

energy which strikes the area each second. But the total amount in the beam of light cannot be greater than the amount that comes through the hole near the point source of the light. If this spreads out over a greater and greater area as the light travels farther away from the source, it follows that the illumination upon each area must be correspondingly less.

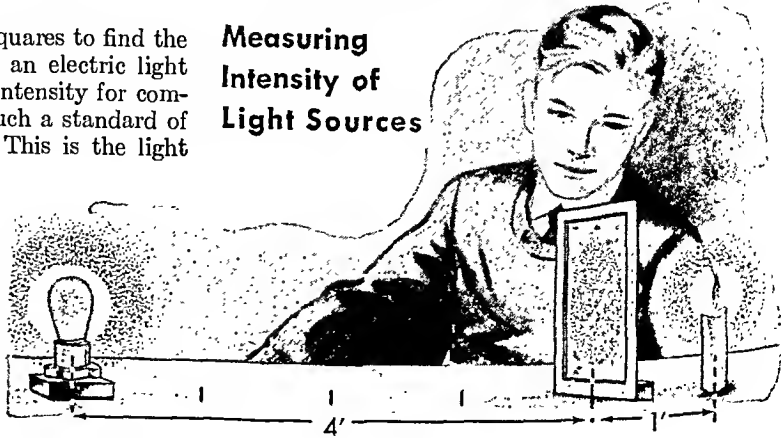
We have just seen that the area covered increases with the square of the distance. Therefore the intensity of illumination upon any area must decrease at the same rate. This fact can be stated as a Law of Inverse Squares. The amount of light a surface receives is *inversely proportional to the square of its distance from the source of light*.

We can use the Law of Inverse Squares to find the intensity of a light source such as an electric light bulb if we have a source of known intensity for comparison. Scientists have adopted such a standard of intensity called the *candle power*. This is the light

one foot away. Therefore if the bulb at four feet produces the *same illumination* as the standard candle at a distance of one foot, the bulb must have 16 times the luminous intensity of the candle. Likewise, if another bulb, five feet from the paper, produces the same illumination the candle does at one foot, the second bulb must have 25 times the luminous intensity of the candle. Thus, when two luminous sources produce equal illumination on a screen between them, the ratio of their intensities is the same as the ratio of the squares of their distances from the paper.

Measurement of the intensity of light sources and of illumination of surfaces is called *photometry*. The

Measuring Intensity of Light Sources



Here is a simple test for measuring the intensity of light. Make an oily spot on a piece of paper and paste this in a frame as shown. On one side of the frame place a candle and on the other side a small light bulb. Now move the paper between the candle and the bulb until the oily spot looks equally bright from either side. Here this happens when the frame is about four feet from the bulb and one foot from the candle. By the Law of Inverse Squares (explained in the article) we now know that the bulb is 16 times as bright as the candle; that is, it is a 16-candle-power bulb.

measuring instruments are called *photometers*. Illumination of a surface is the amount of light energy falling in a second on a unit area. It is measured in *foot-candle* units. A foot-candle is the illumination from a standard candle on a curved surface, when every part of the surface is one foot away. A foot-candle is the same as a *lumen* per square foot. The lumen is (approximately) the amount of light from a standard candle that falls perpendicularly each second upon a square as far from the light as one side is long.

The Law of Reflection

We can learn more facts about light with a mirror and a "point source," such as a small hole in a box containing an electric bulb. To narrow the beam we place a screen with a small hole in front of the box. Then we should use the apparatus in a darkened room, and beat blackboard-eraser dust out along the course of the beam to make it easily seen.

In the accompanying drawing, we see how light is reflected from a mirror. The experiments show that a simple law governs the direction the reflected beam will take. In order to apply the law we must imagine a perpendicular, called the *normal*, rising from the mirror at the point where the oncoming beam strikes it. Physicists call this beam the *incident ray*. (The word incident means "falling upon.") The ray makes an angle called the angle of incidence with the normal.

Now notice the angle between the normal and the reflected ray. No matter how you place the mirror, this angle of reflection *will always be equal to the angle of incidence*. This invariable equality be-

tween the two angles is the Law of Reflection. It was known to the ancients of our civilization at least as far back as Plato's time. If we apply the Law of Reflection correctly, it will always tell where the reflected beam will go.

Formation of Images by Reflection

In nature we see most objects directly as luminous or illuminated sources. When we use mirrors we no longer see the object itself but a counterpart of it, called the *image*. It is transmitted to our eyes by light reflected from the mirror.

The picture at the bottom of the page shows an image reflected from a plane mirror. Notice that our eyes and mind place the image along the line of the light which enters the eyes, not on a line of light from the object itself. Hence in this case we see the image behind the mirror, whereas the object is in front.

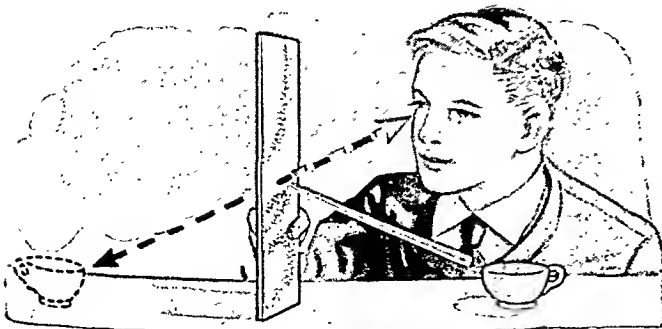
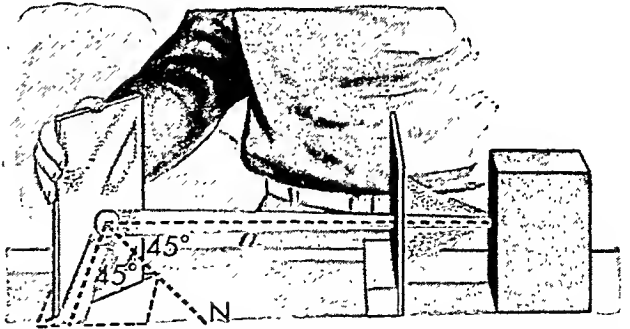
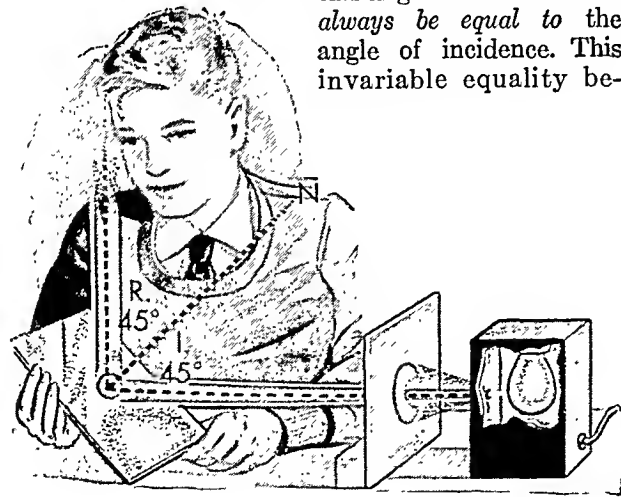
An image of this kind is called *virtual*. If we put a screen or a photographic film where we think we see the cup, neither one would register it. The image seems to exist only because we think we see it. We can also form *real* images by using curved mirrors. A real image has actual existence, because a screen or a film placed where it is formed will register it. More information about the formation of images will be found in the article Lens.

Diffuse Reflection

The surface of any good mirror is flat and continuous. This kind of surface reflects all the incident rays without distorting their relative arrangement. Therefore they form a good virtual image when they strike the eye.

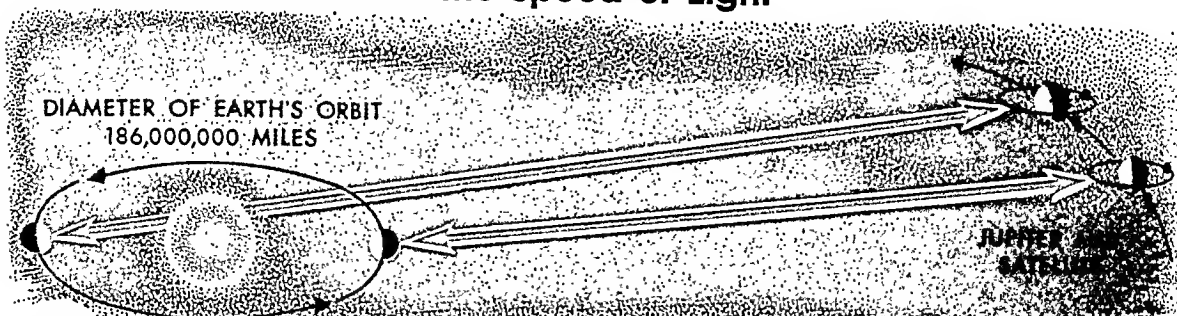
Many rough-surfaced objects reflect light too. But each part of the rough surface acts by itself, like

Simple Experiments with Reflection



The simple laws of reflection can be found with equipment arranged as in the first drawing above. Then notice the positions of the beam from the light box to the mirror (called the *incident beam*) and the *reflected beam*. Now imagine a perpendicular line (N), called a *normal*, drawn to the mirror where the incident beam strikes. No matter how we shift the mirror the normal is always midway between the two beams. Therefore the angle (I) which it makes with the incident ray equals the angle (R) it makes with the reflected beam. This equality of angles is called the Law of Reflection. In the second experiment (right, above) the angle of incidence again equals the angle of reflection. In the third experiment (left) the law still holds. But now we see the reflected image in a different way. Light from the cup strikes the mirror and is reflected to our eyes. But our mind does not allow for reflection from the mirror. We *think* we see the cup in the location it would have if the light were coming to our eyes directly from the cup. So it seems as far behind the mirror as it actually is in front. It is reversed from front to back.

How Men First Learned the Speed of Light



A good telescope will show the planet Jupiter's moons passing frequently into eclipses. In 1675 a Danish astronomer, Olaus Roemer, learned the speed of light from these eclipses. When the earth was near Jupiter he predicted the time of later eclipses. Then he timed them when the earth was on the far side of its orbit. The predicted and observed times differed by 996 seconds. Roemer considered this the time taken by light to cross the earth's orbit. To do so, light had to travel about 186,000 miles a second.

an independent little mirror. Rays are scattered in all directions, and the orderly array which gives a reflected image is hopelessly broken up. This action is called *diffuse reflection*.

Because of diffuse reflection, rough objects act as illuminated sources and not as mirrors. Diffuse reflection gives us the "general lighting" of the world around us. If it did not occur, the world would be all sharp light and shadow, even in the glare of the noonday sun.

Everything in the direct path of the sun's rays would be brightly illuminated. Everything else would be "black as midnight." But most of the objects in nature give diffuse reflection and scatter light into the shadowed places.

Some powerful sources of diffuse reflection are particles of dust, water vapor, and perhaps snow or ice crystals in the air. The particles spread light fairly evenly throughout most outdoor space during all daylight hours. Within buildings, the rough surfaces of rooms and furniture give diffuse reflection. Therefore we see well in rooms with north windows, on the north sides of buildings, and beneath the trees.

Diffuse reflection is both foe and friend when we perform the experiments described in this article. If we tried them in a lighted room, diffuse reflection would break up

the sharp edges of the light beams, and the experiment would fail. In a darkened room, the beams are sharp. But we might not see them well when we look at them sideways if we trust the dust in the air to make them visible. By placing chalk dust along the path, we get plenty of diffuse reflection.

Men who have gone 30 to 40 thousand feet high in balloons and airplanes report that the sky appears black, stars appear, and the sun becomes a sharply

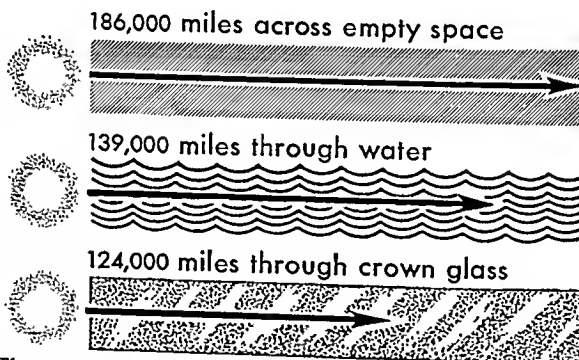
defined orange ball. This happens because there is little or no dust at these heights. As a result, there is no diffuse reflection.

The Amazing Speed of Light

For many centuries men thought that light acted instantaneously over any distance whatever, because they could not time the speed at which it travels. Galileo tried to measure the speed of light by having men flash lights at each other from distant hilltops and timing the flashes. He did not guess that in the time the men needed to act, light could go around the world. So the experiment failed.

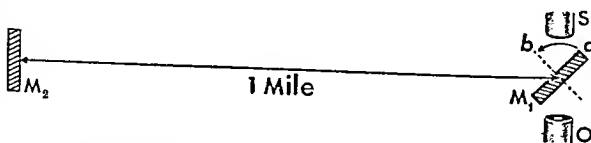
In 1675, Olaus Roemer, a Danish astronomer, got the first good idea of how fast light travels. He did it by timing the eclipses of the planet Jupiter's satellites, as shown in the picture above. The result that Roemer obtained with his crude equipment was surprisingly close to the figure scientists find today.

In One Second Light Will Travel . . .



The speed of light varies with the density of the different materials through which it travels. Above we see the approximate speed of light through air, water, and crown glass. We note that it has less and less speed as it gets into denser materials. This difference in speed enables us to bend (refract) light rays with prisms and lenses made of glass.

Measuring Light Speed



Above we see the ingenious method developed by Professor A. A. Michelson for measuring the speed of light. A source (S) throws light upon a rapidly rotating mirror (M_1). When the mirror is at (a), it throws light onto mirror (M_2) one mile away. Meanwhile the mirror has reached a certain position (b). If it reflect the light to an observer (O). For simplicity the difference between positions (a) and (b) is shown as a quarter turn. The experimenter sets the mirror (M_1) in motion and increases the speed until he sees light. In the arrangement shown above, time light takes to go two miles to and from mirror M_1 . From the known turning speed, the speed of light can be figured. An actual experiment uses a much smaller turn.

A highly accurate optical method for determining the speed of light was developed by the American physicist Albert A. Michelson. In 1935, after his death, co-workers published a figure of 186,271 miles a second. (See also Michelson)

In 1950 Louis Essen, a British physicist, announced a new determination of 186,282 miles a second. This figure was confirmed in the United States and Sweden, but not all scientists have accepted it. Essen measured the frequency and length of radio waves (which travel at the same speed as light). From these figures he could easily compute the speed of the waves. For his measurements, he used a *cavity resonator*, a short closed tube in which waves "echo" from end to end.

How Light Is "Bent"

Everyone has noticed how a spoon placed in a glass of water seems to be bent where it enters the water. Plainly, the light which enables us to see the underwater part of the spoon must have been bent in some way. Scientists call this bending *refraction*.

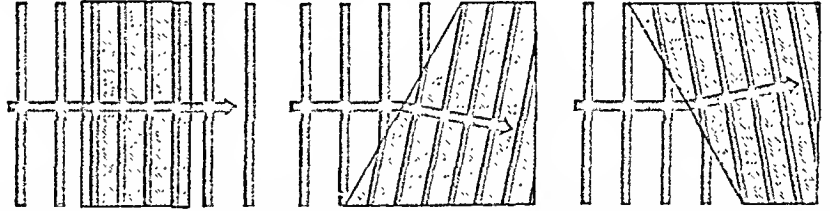
Refraction occurs only when light is passing through transparent substances such as air, water, or glass. It differs from reflection because reflected light bounces back from a surface instead of passing through. Refraction commonly occurs at an interface, or dividing surface, between two such substances. The spoon in the glass appears to be bent only at the point where air and water meet.

The bending occurs because of one simple fact: *light travels at different speeds in different mediums*—that is, transparent substances. Roughly, the denser the medium, the more it slows down light. The amount of slowing is shown for some common materials in a picture on the preceding page.

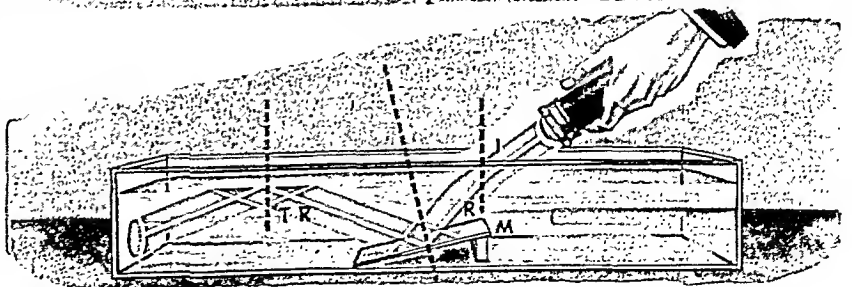
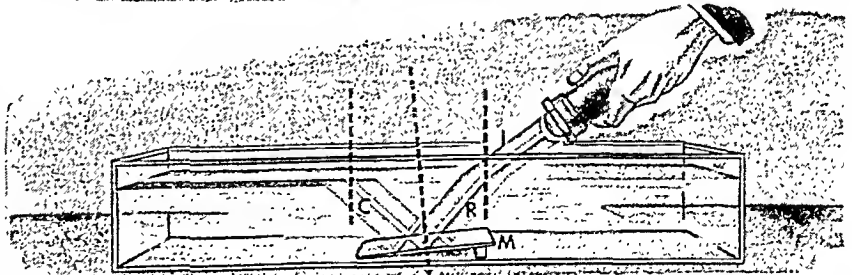
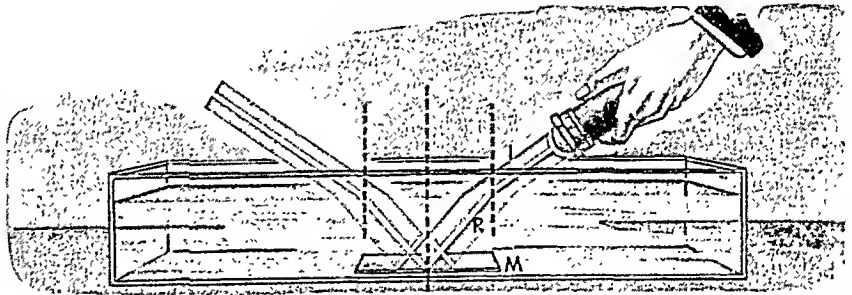
Bending occurs, as shown by the upper pictures on this page, in some predictable direction whenever waves (or rays) of light strike a slanting interface between two mediums. We use this fact for countless useful purposes in prisms and lenses. Details are given in the article on Lens. Two other common instances of refraction are shown in the lower pictures on this page. If we study them closely, we can see how adjustment to a certain *critical angle* will make a refracted beam skim along the surface of water. The

critical angle for the refraction of light passing from water to air is about 48.6° . If light in water shines up toward the surface and makes this angle with the normal, it is refracted away from the normal to an angle of 90° when it hits air. A greater angle of incidence causes the light to be reflected at the surface back into the water. This is called *total reflection*. Here again the Law of Reflection holds good. The angle of incidence equals the angle of reflection. Architects and interior decorators achieve many novel and beautiful lighting effects through the use of the critical angle and the angle of total reflection.

Refraction or "Bending" of Light



Light radiates from sources in spherical waves. Before long the spheres become huge and any small segment of a wave looks flat or "plane." In the first picture above, plane waves strike a pane of window glass. It slows them down, but they resume speed in the same direction after emerging. The next pictures show waves striking an oblique surface of glass. The part that strikes first is slowed down most, and the wave's direction of motion is altered. The change is called *refraction*. If the direction of motion is shown by a ray, the ray is bent.



A flashlight, mirror, and glass aquarium show refraction in water. In each drawing, the incoming (incident) light beam is bent (refracted) at the water's surface toward a perpendicular to the water surface called the normal. Angle R is smaller than angle I. The beam is reflected from the mirror (M). When it leaves the water in the first drawing it is bent away from the normal. In the next drawing the mirror has been tilted to make angle C equal 48.6° . We call this the *critical angle* because it sends the light along the surface of the water. Finally, we raise the mirror a little more. Then we get *total reflection*. All the light is reflected back into the water.

Prism binoculars are made with lenses that totally reflect light, thereby producing erect images.

How We See Objects About Us

Anything which gives off light, such as the sun or a burning candle, does not need any other source of light to be seen. We see it glowing or shining by the light it gives. But nonluminous objects can only be seen by light which strikes them from a luminous source. This light reveals the objects in different ways, according to the characteristics, relative to light, of the substance in the object.

When we look out through a window on a bright day, we see the outside scene clearly. A substance such as glass or cellophane which we can see through clearly is said to be *transparent*. Most electric light bulbs are frosted and behave somewhat differently. They pass light through from a heated filament, but break it up, so we cannot see the filament. We see the light as a diffused glow from the surface. A substance which does this is said to be *translucent*. Substances such as stone, iron, and wood which block light completely are said to be *opaque*.

Opaque objects can be seen only by reflected light, since they transmit none. Translucent and transparent objects show both transmitted and reflected light. A perfectly transparent substance would be invisible, as long as light shines through it, since we would see only what lies beyond. We are made aware of transparent substances by light reflected from their surfaces and by imperfections in their transmission of light.

Newton's Theories About Color

The modern explanation of color has developed gradually. Modern scientific thinking about it started in 1666, with the conclusions drawn from three notable experiments performed by Isaac Newton. First he passed a beam of white light through a three-sided piece of glass called a *prism*. The light came out as a band of colors. At one end was deep red, followed by orange, yellow, green, blue, indigo, and violet. There were no sharp divisions between the colors, but a gradual blending.

Next he placed another prism near the first, but with its faces opposite to those of the first one. Then he passed a band of colors produced by the first prism through the second one. The second one changed the band back into white light. Thus Newton proved that white light consists of all the various colored lights in the band. The first prism separated them. The second one mixed them together again.

Third, he passed a single color (*monochromatic light*) through a prism to see if it could be broken up. The color came out unchanged. From this Newton concluded that each color must correspond to a *pure light*, which cannot be broken up. White light is a mixture of pure (colored) lights. The band of colors produced from white light is called a *spectrum*.

The Nature of Light

Newton made many other studies of light and developed a theory concerning its nature. His view, called the *corpuscular theory*, suggested that light

phenomena were caused by minute particles (corpuscles) traveling in straight lines at enormous speed. A rival theory was advanced by the Dutch physicist, Christian Huygens (1629-95). He believed light to be a form of wave motion that occurred in a weightless, invisible medium called the "luminiferous ether."

It is important to avoid misunderstanding about the meaning of the wave theory. The true meaning is suggested with diagrams in the article on Radiation. This explanation points out that "light waves" are not really waves, like those on water. They are a series of maximum and minimum disturbances in space, which travel outward in all directions from every luminous source. A *wave length* is the space from the maximum of one disturbance to the maximum of the next, or between other corresponding points in the wave form.

The wave length of visible light is very small, ranging from .000014 inch to .000028 inch. As in all scientific work, light is measured with the metric system of units (centimeters, millimeters, etc.). But because of its short length, the wave length of visible light is measured with a smaller unit called the *Angstrom unit* (abbreviated A.U. or Å.). One Angstrom unit is equal to 1/100 millionth of a centimeter (10^{-7} cm.). Thus the range of visible light extends from about 3800 A.U. to 7800 A.U.

Rivalry between Theories About Light

When the rival corpuscular and wave theories were announced by Newton and Huygens, either one could explain the facts then known about light. Corpuseles could be expected to rebound from reflecting surfaces, as a tennis ball does from the ground. But a wave also reflects in the same way, as anyone can see by noticing one strike slantwise against a breakwater and seeing the direction taken in rebounding.

Refraction could be explained by the wave theory. But the corpuscular theory could explain refraction too if one could imagine interacting forces between the particles of glass and the passing corpuscles. These forces could be used to explain refraction (bending) of streams of corpuscles and account for the refraction actually produced by prisms and lenses.

"Straight line" propagation of light, however, proved a stumbling block for the wave theory. If light is carried by waves, men argued, why does it not "turn corners," as do water waves? If light consisted of corpuscles, however, straight line propagation was easily understood. All light striking an obstacle would be blocked, and the light not striking would continue traveling in a straight line. So Newton and most of his successors in science believed in the corpuscular theory until 1801. Then a young English physicist named Thomas Young discovered facts which the corpuscular theory could not explain.

Young's Discovery of "Interference"

The simplest of Young's experiments consisted of placing two tiny holes in a screen and shining light through them onto another screen. When the holes were arranged so that the two resulting spots of light partially overlapped, tiny fringes of light and dark-

ness crossed the overlap. Nothing in the corpuscular theory could explain this. The wave theory, however, did so readily, as the accompanying diagram shows.

Thus the wave theory explained some things which the corpuscular theory could not. But the corpuscular theory had a better explanation for straight-line propagation of light. The wave theory, however, won out. Scientists found that light *does* bend around corners like water or sound waves. But the amount of energy that goes around the corner decreases for waves with higher forward speed and shorter wave lengths. Thanks to the amazing speed of light, the amount of energy that gets around corners can only be detected by extremely delicate measurements. When scientists learned how to make the necessary experiments, they detected the bending.

Once they did so, the wave theory could explain everything men had detected in the behavior of light, including the phenomenon of interference. Since the corpuscular theory could not explain interference, there seemed to be no reason left for believing it. So early in the 19th century scientists generally swung over to the belief in the wave theory of light.

Later the wave theory ran into trouble again (see Radiation); but many features of the theory still remain in universal use. All the phenomena discussed in the rest of this article are explained in terms of waves, a series of maximum and minimum disturbances.

Color and the Wave Theory

When the wave theory was accepted, Newton's findings became a logical part of it. Scientists said that every color corresponds to a different wave length of light. White light is merely a mixture of all wave lengths. When the white light strikes a prism, each light wave is bent to a different degree. Red light, which has the longest wave length, is bent the

least. Violet light, which has the shortest wave length, is bent the most. The other colors have wave lengths anywhere between these two extremes. The following table gives the approximate range of wave lengths, in Angstrom units, of the principal colors in the spectrum of visible light:

Red.....	6300-7800
Orange.....	6000-6300
Yellow.....	5600-6000
Green.....	4900-5600
Blue.....	4400-4900
Violet.....	3800-4400

The ability to separate light into its component wave lengths opened vast new possibilities in the study of visible and invisible light. Scientists added a telescope and scale to the prism, and had an instrument for measuring wave lengths of light. Since the band of colored light produced by a prism is called a *spectrum*, scientists called this instrument a *spectroscope*. Some of its uses and the knowledge it reveals, particularly about the nature of the sun and the stars, are told elsewhere (see Spectrum). Further details about color phenomena, with diagrams in color, are given in the article on Color.

During the 19th century men like D. F. Arago (1786-1853) and Augustin Fresnel

(1788-1827) used the wave theory and particularly interference to answer many hitherto vexing questions. Among them were questions concerning the diffraction of light, used in the diffraction-grating spectroscope, and the nature of polarized light, to be explained later. They explained the shimmer color called *iridescence*, displayed in opals, soap bubbles, oil floating on water, and in some bird plumage and fish scales, as the product of interference. A notable application of interference was made by Michelson when he invented his *interferometer*. With this instrument scientists can measure displacements as small as a fraction of a wave length of light.

By inventing the interferometer, Michelson had hoped to discover something about the nature of the

"INTERFERENCE" AND ITS EFFECTS

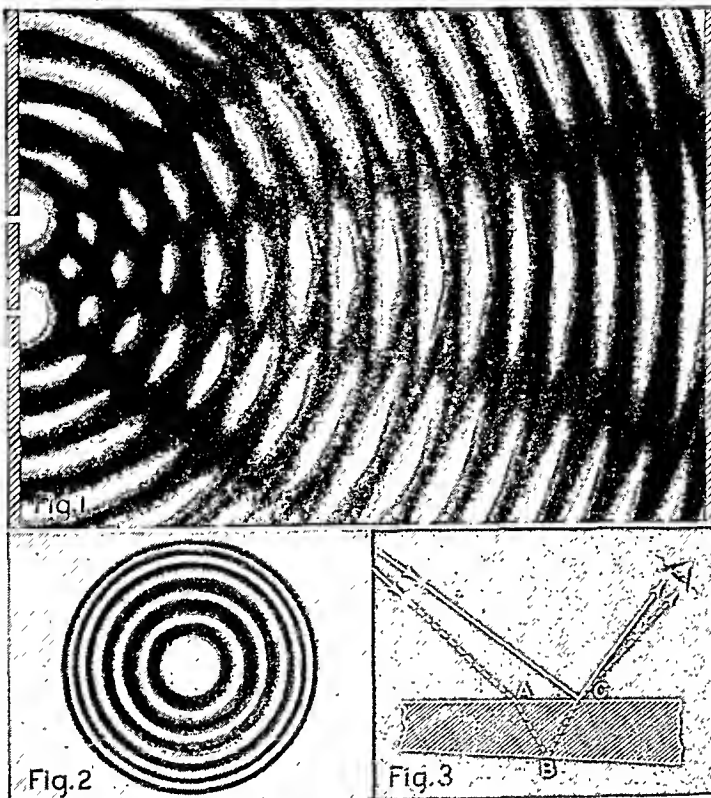


Fig. 1 illustrates Young's experiment, described in the text, which led scientists to believe in the wave theory of light. The dark lines represent the "troughs" of light waves radiating from the two pinholes at the left, the crests being between. Notice that only along three lines in the picture do "troughs" fall on "troughs" and "crests" on "crests"—so that light travels outward along these lines and can strike a screen. In between, the waves "interfere" with each other and no light passes outward. Hence alternate bands of light and darkness will strike a screen, as Young found. Fig. 2 shows "ring interference," called "Newton's Rings" from the experiment Newton made but did not explain, obtained similarly by laying a convex lens on plane glass. Fig. 3 shows the cause of *iridescence*, or shimmering color, as in an opal, films of oil, and certain bird feathers. If light strikes a thin, wedge-shaped film, certain rays as at A, will strike in, be reflected from the bottom of the film, as at B, and emerge, with further refraction, as at C. All rays reflecting directly from C, except those of one color, will interfere with the other ray—so only that color is seen. As the shape of the wedge, or the observer's position changes, so does the color which "gets through."

HOW MIRRORS CAN "ANNIHILATE" LIGHT

Fig. 1. In this diagram the double wavy line represents a ray of light coming from a source off to the left and striking a mirror at an angle. According to the rules of mechanics, all forces in a wave can be resolved into these two. To understand how such a wave is "polarized" by mirrors, remember that space is supposed to be capable of transmitting *transverse* vibrations—that is, waves which, as shown by the arrows, move crosswise to the direction the pulse is traveling. It is supposed, however, not to transmit *longitudinal* vibrations—that is, those moving to and fro along the direction of the motion. Now see how this wave strikes the mirror and is reflected up-

ward along the line A-B, the center of impact being at A. Remember now what was said about space being unable to transmit longitudinal vibrations, and see how this affects the reflection at A. If the "angle of incidence" is 57° (for an unsilvered mirror in air) the movements of the vertical wave would have to be reflected as longitudinal pulses. Since this is impossible, they are absorbed by the mirror along the line A-C; but the horizontally vibrating wave is reflected perfectly, as shown. Note, however, that all its vibrations are in one plane. That is, it has been "plane polarized." To the eye, this merely weakens the light—but by comparing Figs. 2 and 3, we shall see the polarization.

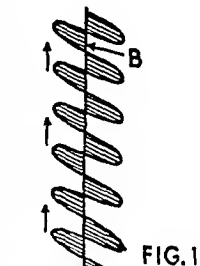


FIG. 1

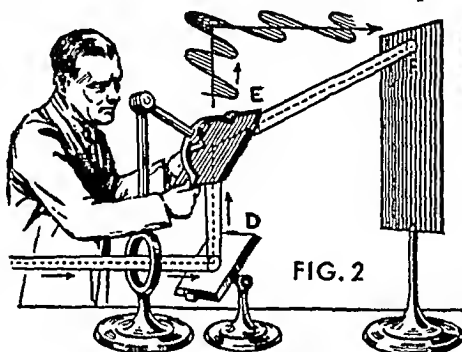


FIG. 2

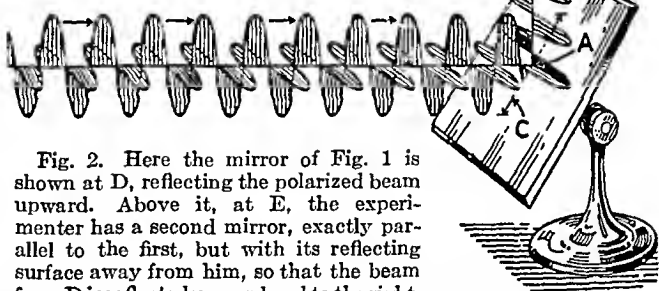


Fig. 2. Here the mirror of Fig. 1 is shown at D, reflecting the polarized beam upward. Above it, at E, the experimenter has a second mirror, exactly parallel to the first, but with its reflecting surface away from him, so that the beam from D is reflected upward and to the right. Since the vibrations in the beam come transversely, they can be reflected transversely, as shown in the little sketch, to strike the screen at F.

Fig. 3. Here we see the phenomenon which, by contrast with the negative result in Fig. 2, demonstrates that the light has been polarized. The observer has turned the upper mirror horizontally through 90 degrees, to the position shown. Now, as the little sketch shows, the vibrations of the polarized beam are in the same situation as were the vertical vibrations at A in Fig. 1. In order to be reflected outward along the line G-H, as the ordinary laws of reflection require, they would have to travel as longitudinal vibrations—which our assumptions tell us cannot be done. The facts bear this out, for no light is reflected. Although this arrangement of mirrors is able in any other position to reflect light perfectly well, in this position it *annihilates the beam of light*. Presumably the vibrations are absorbed along the line G-J of the upper mirror. This result, which would have marked any man as a great magician in other days, is only one of many polarization effects science can obtain.

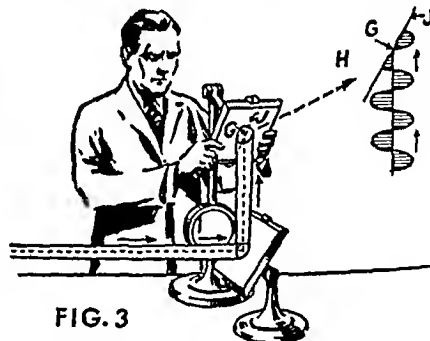


FIG. 3

ether, the medium through which light was supposed to travel. Scientists had "invented" the ether, but no one had actually discovered it. Together with his co-worker, E. W. Morley, Michelson performed several "ether-drift" experiments (see Michelson). But their experiments gave no evidence that such a medium existed and created a major difficulty for the wave theory. The negative results of these experiments gave rise to new conceptions in physics, which resulted in the Einstein theory of relativity (see Relativity; Physics).

The Odd Nature of "Polarized Light"

One of the great triumphs of the wave theory was Fresnel's explanation of how light is polarized. This can be done with certain transparent substances such as tourmaline or Iceland spar, a transparent calcite (see Calcium), which transmit light waves so they

vibrate only in one plane. Thus, when light passes through a thin slice of tourmaline, all the vibrations are shut out except those in the direction of the crystal's axis, straight up and down for example, just as if the light had been squeezed through a narrow slit. This light ray is now *plane polarized*. If another crystal is placed back of the first, with the axes in the same direction, the light will pass through, but if the axis of the second crystal is placed at right angles to that of the first, the light will be shut off entirely, as no vibrations can pass. The same curious effect can be obtained with mirrors, as the pictures show.

Polarized light is immensely useful to chemistry and industry because many common substances *rotate* the plane of polarization, and measuring the amount of rotation reveals facts concerning the substance. Glucose, or the sugar of corn syrup, for example, is

indistinguishable chemically from fructose, or grape sugar. But a solution of glucose in water rotates the plane of polarized light to the right (and hence is called dextrose), while a solution of fructose rotates it to the left (and so is called levulose). Similar effects are given by other sugars, so measuring the rotation they produce in polarized light distinguishes them. Polarized light is used also to identify minerals, as it reveals a distinctive color pattern in each one.

Such tests are made with an instrument called a *polariscope* (or *saccharimeter*, when designed to test sugar). This contains at one end a crystal or Nicol prism (the polarizer) to polarize a beam of light, and another crystal or prism (the analyzer), through which the polarized light must pass, at the other end. So long as nothing is between the two and their optical axes are parallel, polarized light will pass through the analyzer. If now a solution, say, of sugar be placed between the two, it will rotate, or twist, the plane of the polarized light. This "twisted" light no longer can get through the analyzer, until the optical axis of the latter is brought into line with the new plane of the light. Now the light comes through; and by knowing how much he had to rotate the analyzer to bring this about, the operator knows how much rotation the solution imparted to the polarized light.

A new material called *polaroid* has many useful applications. This is a thin sheet of plastic containing microscopic crystals, all lying parallel. It allows the passage of light vibrations in only one plane, and so it is used in sunglasses, camera lenses, desk lamps, and binoculars to reduce glare.

Fluorescence of Light

Although X-rays are invisible we can "see" with them by placing an object such as a hand between the source of the X-rays and a screen of some material such as calcium sulphide. Viewed in the dark, the screen glows with a faint greenish light, and on it we see a sort of "shadow-graph" of the bones in the hand. This glowing is called *fluorescence*.

Fluorescence is a transformation of one kind of radiation—in this case, X-rays—into some form of visible light. That is, the fluorescing substance has the property of taking in electromagnetic radiation, and emitting it, transformed into a radiation of longer wave-length. This distinguishes it from phosphorescence (see Phosphorescence and Luminescence). Calcium sulphide transformed the "short-wave" X-ray energy into longer wave greenish light. Other substances transform ultra-violet radiation into visible light, quinine showing blue and chlorophyll red. Although medieval alchemists could exhibit fluorescence, it was not until 1852 that Sir G. G. Stokes (1819–1903) explained it and derived the name from fluorspar (calcium fluoride), which exhibits it. Fluorescence is

used for non-glare lighting and in making tests with ultra-violet rays (see Electric Light).

Actinic or Chemical Effects of Light

Light possesses certain chemical properties, or *actinic effects* (sometimes called *actinism*). Since most animals and plants have always lived under light, it is not surprising that they have become able to utilize these chemical powers to perform certain of their vital processes. The best known of these, and possibly the least understood, is *photosynthesis*, by which green plants use light energy to build water and carbon dioxide into carbohydrates (see Leaves; Plant Life). The human body also relies upon certain chemical effects in which the ultra-violet rays beyond the visible spectrum play a large part (see Ultraviolet Radiation; Vitamins). The chemical effect of light upon certain metallic salts is utilized in photography and is responsible for the action of photographic films and plates (see Photography). Sunlight has a bleaching effect, known and utilized for many years, as in the hand manufacture of linen.

Man's direct use of light for illumination is discussed elsewhere (see Electric Light and Power; Gas, Manufactured; Lamps; Lighting). The article on Radiation sketches modern theories of light in relation to the quantum theory.

LIGHTHOUSES AND LIGHTSHIPS. In the days when Columbus and other bold mariners set sail on uncharted seas, they were in constant peril even in European waters from shoals and submerged rocks. Today the ocean lanes are dotted with more than 13,500 lighthouses and lightships, whose powerful beacons guide the seaman; and every harbor is marked

by buoys and other signals as plainly as a city street.

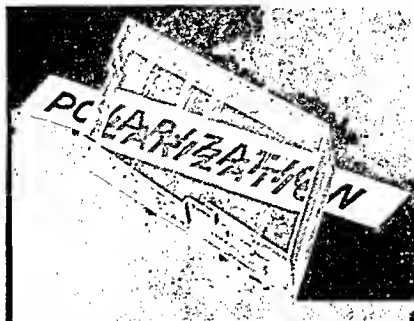
If it could only speak, the lighthouse on its perilous reef could tell many a thrilling tale of all that it has seen. Brave and skilful men have laid its foundations, sometimes working on half-submerged ledges buffeted by the waves, sometimes in caissons boring deep through the sand to bed rock.

The history of the lighthouse is alive with the tales of heroism of brave keepers, who in the face of countless storm perils, shifting sands, explosions, terrific gales, and the devouring action of the sea, have

pluckily performed their duty of guiding ships safely to port. One classic example is that of Grace Darling (1815–1842) daughter of an English lighthouse keeper, who with her father rescued nine exhausted survivors of the *Forfarshire*, after hours of struggle in a hurricane. Another story, equally heroic, is that of the old woman tender on Angel Island in San Francisco Bay, who when the fog signal was disabled, stood on an exposed platform for 24 hours, striking the bell.

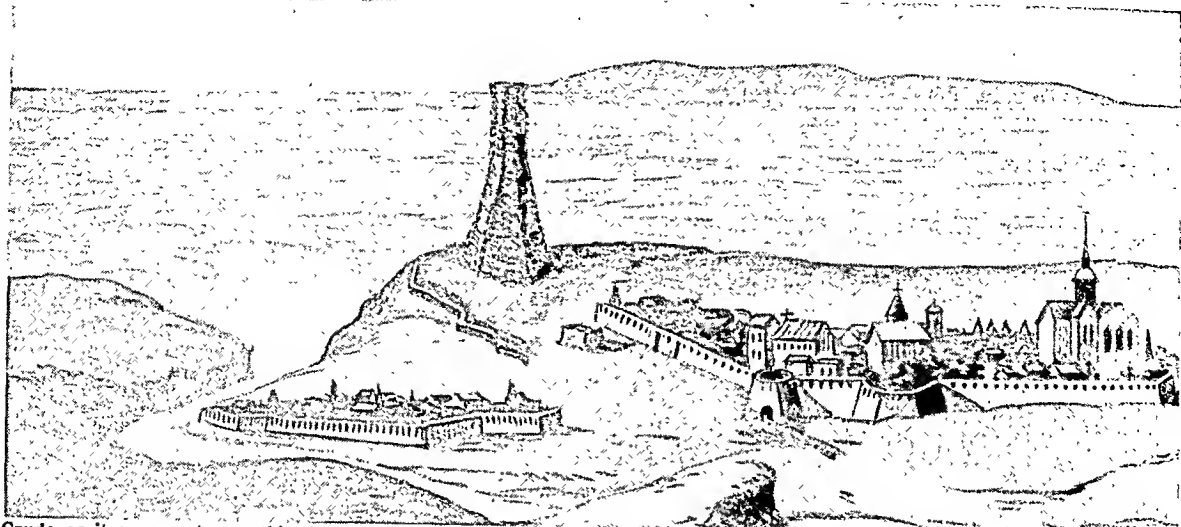
Most modern lighthouses are equipped with automatic lights, and are visited only at rare intervals by a tender. The modern keepers, therefore, must combine a thorough technical training with the old virtues of courage and reliability. They must know the Diesel engine, used to generate current for light and power; the air compressors for vapor lamps; and the use of radio beacon transmitters (see Radio).

DOUBLE REFRACTION



Polarized light is responsible for this effect, exhibited by Iceland spar and other substances. The crystalline structure polarizes the light, then refracts each plane of polarized light differently, giving the double image shown.

A GUIDE FOR SHIPS IN OLDEN DAYS



Crude as it appears to us, this lighthouse did its work faithfully at Boulogne in France for 1,400 years after it was built by the Romans. The powerful flashing lights we use were unknown in those days, of course, and the warning light was furnished by bonfires, but even such a signal was a tremendous improvement upon groping blindly through a stormy night. The picture is taken from an old print of the famous structure.

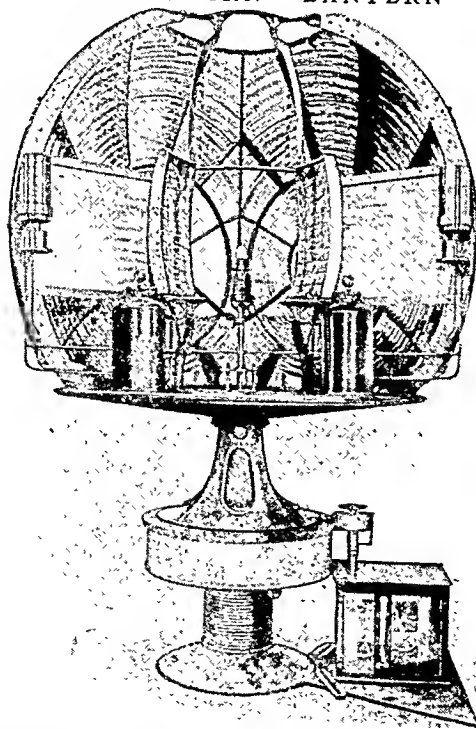
Until recent years lighthouses were huge piles of masonry of great thickness to withstand the buffeting of wave and wind. Today the typical lighthouse is a tapering cylindrical steel tower from 100 to 400 feet high, bolted into the solid rock of a reef or into a masonry foundation. A winding staircase within leads up to the gigantic lantern at the top, whose blinding shaft of light may be seen from the deck of a vessel 20 miles away or more at sea.

The lantern consists of from two to eight lenses held by a light metallic frame, with reflectors, lenses, and prisms which concentrate the light and throw it out. It is usually set in a revolving carriage moved by clockwork, so as to show a regular series of flashes by which one lighthouse may be distinguished from another. The light itself, which in olden days was made by means of coal fires, candles, and whale oil lamps, is today produced by big lamps burning vaporized kerosene, by acetylene, or by electricity.

In the earliest lighthouses, centuries before the Christian era, the light came

from a brazier of burning coals hung from a pole. As far back as the 7th century B.C. there was a lighthouse at Cape Sigeum on the Asiatic side of the Dardanelles. The most famous lighthouse of

THE MODERN "LANTERN"



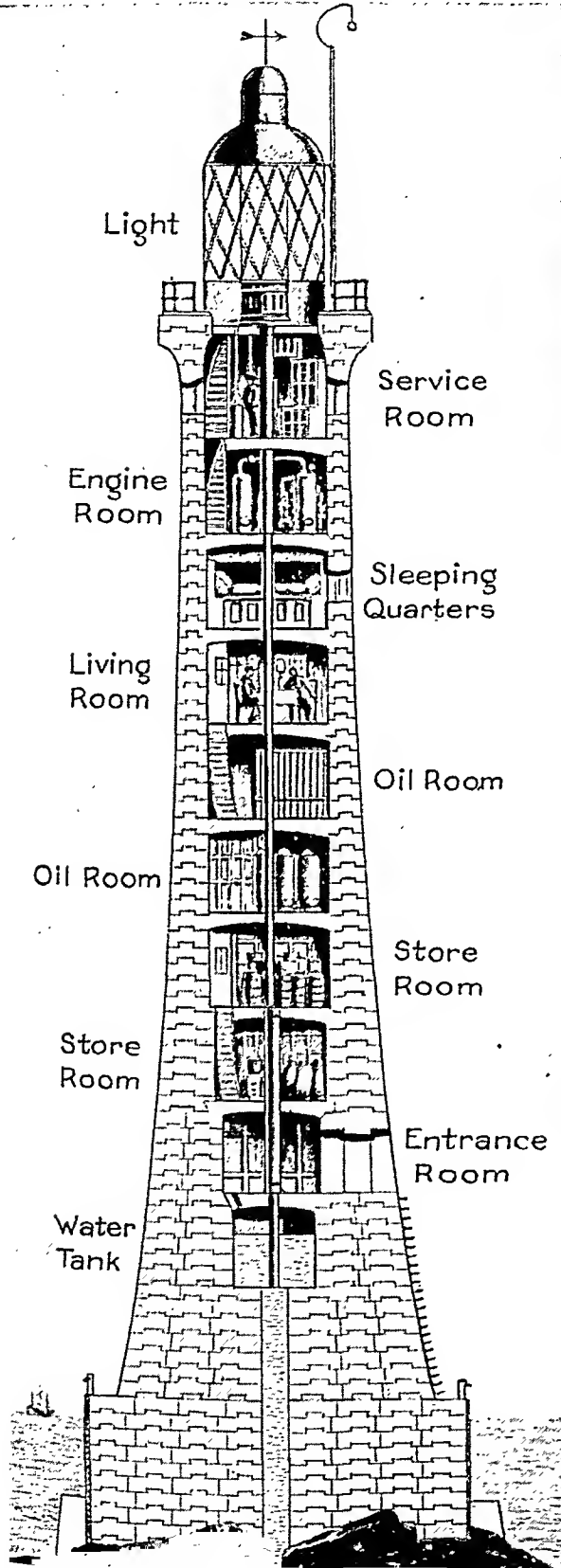
The light comes from that little acetylene-burning gas mantle in the center. Its rays are caught up and magnified by the complicated system of reflectors and lenses at the sides and shot out in horizontal beams, visible at great distances. At the lower right hand side you can see the clock-work which revolves the lantern so that its beams can be seen at regular intervals, thus enabling pilots to identify the lighthouse.

antiquity was the tower built on the island of Pharos in the bay of Alexandria in the 3d century B.C. This was considered one of the Seven Wonders of the World, and for a long time the name "pharos" was given to all lighthouses. At Boulogne, on the French side of the English channel, the Romans built a great tower 192 feet around and 200 feet high, which guided mariners for more than 14 centuries.

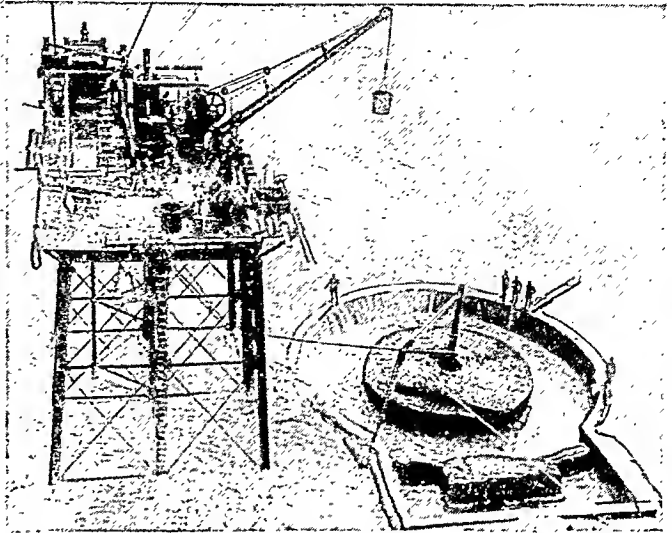
Among the most famous lights of today are the Eddystone, 13 miles off Plymouth, England, which has been rebuilt three times since 1698; the Bell Rock, off the coast of Scotland; and Minot's Ledge. The last—one of the most difficult engineering works of the world—rises from a sunken, wave-swept reef in the open Atlantic 20 miles southeast of Boston.

Off dangerous coasts and at the entrance to harbors where lighthouses cannot be built, strong steel lightships

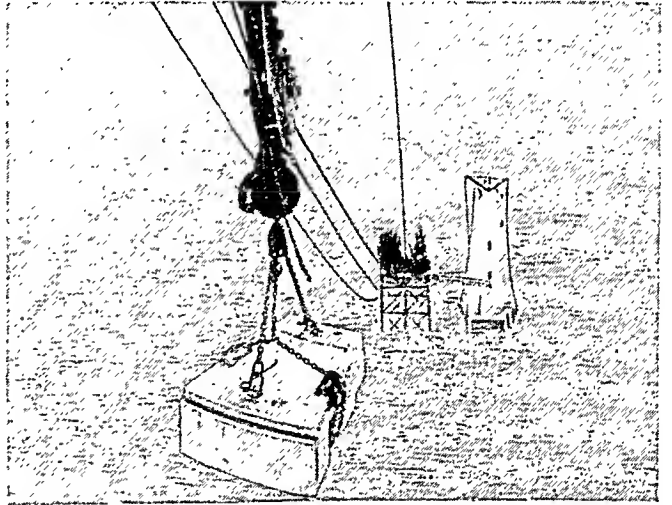
THE BIRTH OF A MODERN LIGHTHOUSE AND ITS STRUCTURE



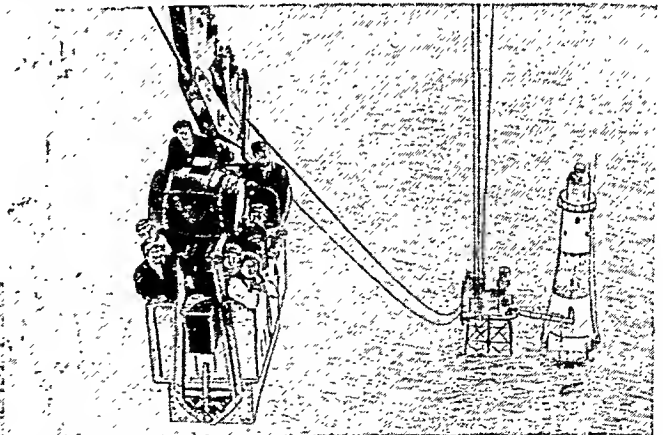
INTERIOR PLAN OF A LIGHTHOUSE. This shows you how a modern lighthouse of the stone masonry type is built. Notice how heavy the walls are at the bottom where they have to withstand the heaviest shocks.



LAYING THE FOUNDATION. This part of the work often has to be conducted from a temporary stage set up beside the lighthouse site. When the seas are rough, this work is extremely dangerous.

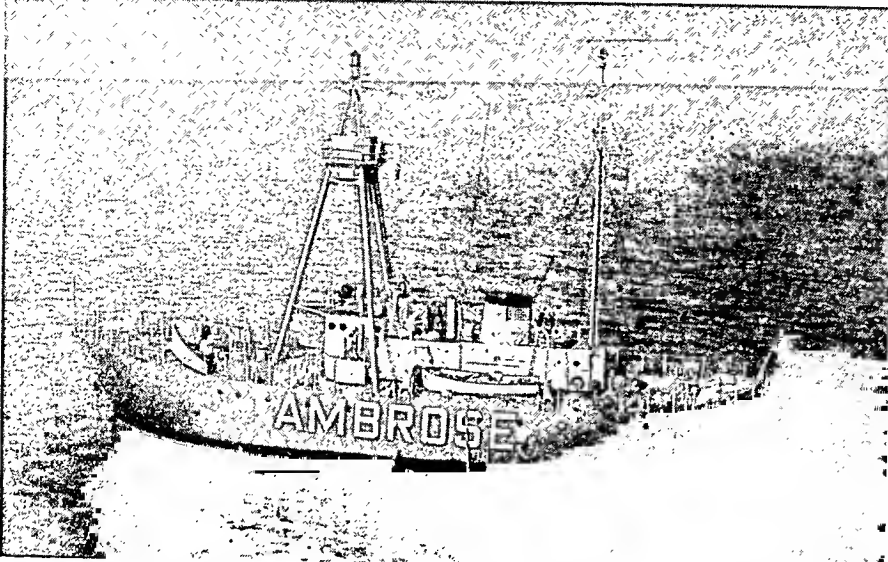


DELIVERING MATERIALS. Building materials for the lighthouse sometimes have to be delivered along cables, strung like giant spiders' webs from nearby cliffs. Here we see a great block of stone on its perilous journey.



A THRILLING TRIP TO WORK. Workmen as well as materials must make that dizzy trip along the cables, when such lighthouses as the Beachy Head light on the southern coast of England are being erected.

A "FLOATING LIGHTHOUSE"—AMBROSE LIGHTSHIP



This sturdy 128-foot craft is the 540-ton Ambrose Lightship. It lies at anchor in Ambrose Channel year in and year out. It guides

ocean ships in and out of busy New York Harbor with its powerful light, submarine bell, foghorns, and radio beacon.

are moored. These vessels have masts bearing lights and foghorns. Some have radio beacons, radar, and submarine sound signals to give warning in foggy or stormy weather. Each ship carries several men, relieved periodically by a tender. The United States maintains about 35 lightships anchored at regular positions, or stations, and also as relief vessels.

Other navigation aids such as buoys mark channels and minor obstructions. Channels are marked on the right, as ships come in, by red buoys of conical shape, called "nuns"; black "cans," or flat-topped buoys, mark the left edge (for picture, see Navigation).

Many buoys bear steady or flashing lights, either red or white. Some have bells or whistles to give warnings during fogs or snows. Acetylene or electric storage batteries provide the illumination, and a photoelectric cell turns the light off during the day. Such buoys can be left untended for months.

The United States maintains about 38,000 aids to navigation on the seacoasts, the Great Lakes, inland rivers, in Alaska, and the island possessions. These aids are in charge of the Coast Guard in the Treasury Department, which in 1939 took over the duties of the Bureau of Lighthouses. In Canada the Marine Services of the Department of Transport administers lighthouses. In Britain this is the responsibility of the Corporation of Trinity House.

LIGHTING. In the well-lighted homes of North America, we can hardly imagine the darkness within the houses of a few generations ago. Throughout most of the 19th century people read or worked at night by the light of oil lamps or gas lights. Before that time people used candles for lighting.

Houses have had good windows for several centuries, but in ancient and medieval times they were small and poor (see Shelter). The first glass windows were probably used in ancient Rome. They were made of

small pieces of glass set in bronze frames. After the Dark Ages glazed windows with tiny panes joined by strips of lead appeared. In those times, however, the poorer homes got daylight only through windows covered with parchment or oiled paper.

As manufacturers made better and cheaper glass, windows became larger and more numerous. Even after glass became generally available, however, the number of windows in a house was kept down in some countries because a tax was put on them. Such a tax was levied in England in 1696 and was not repealed for 55 years. The early American colonists used oiled-paper

windows, for glassworkers were scarce. Not until the 19th century did cheap glass become common.

Many materials besides glass have been used for windows. Horn and isinglass have served like oiled paper to admit light. In Oriental lands, costly alabaster is sometimes cut to almost paper thinness and used for windows. In warm climates, windows are often not sealed at all. There, windows formed of delicate wrought-iron tracery adorn the houses of the wealthy.

Lighting at Night

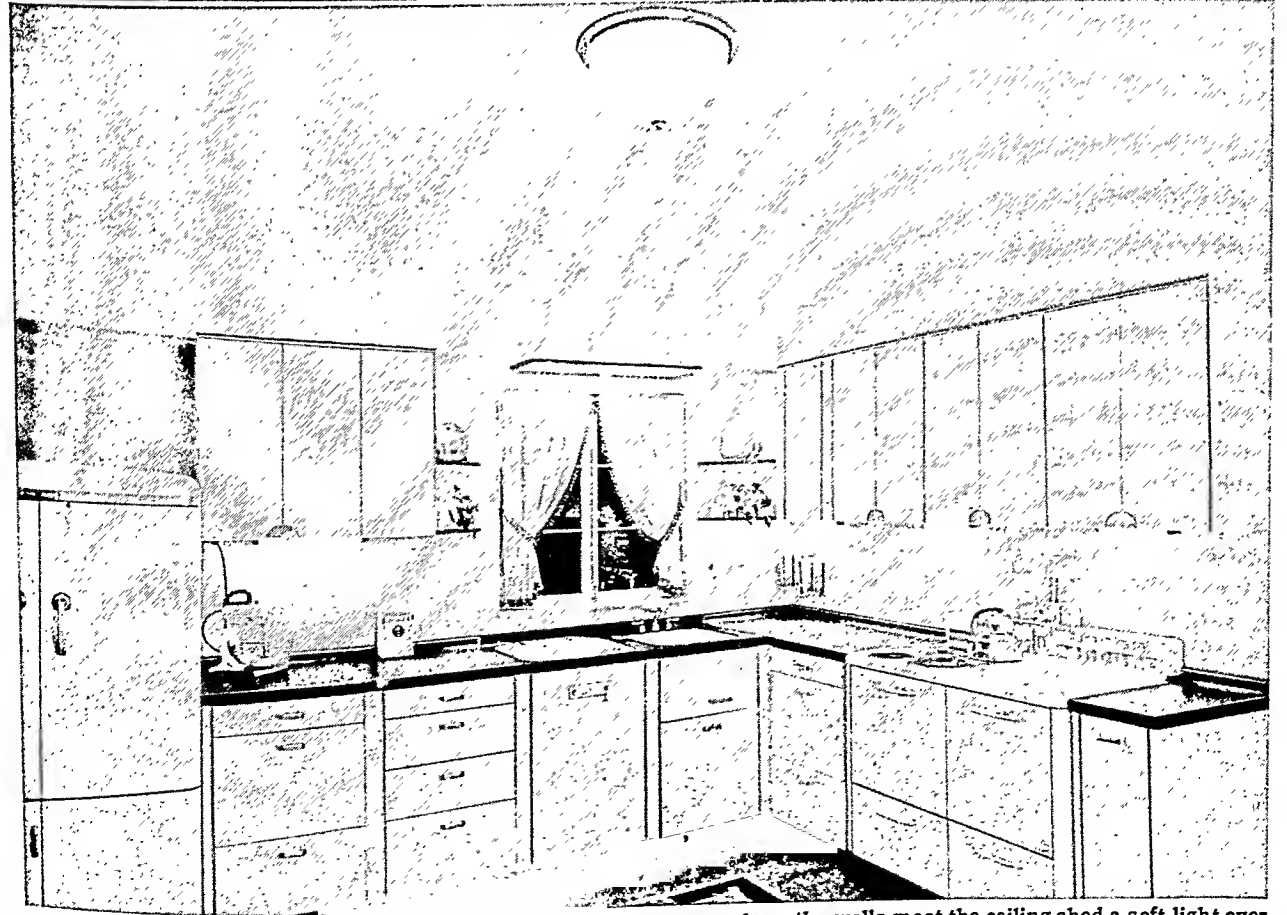
Introduction of the incandescent electric lamp revolutionized the practice of artificial lighting. It provided new efficient lighting, and, in time, added new beauty to dwellings, offices, and public buildings.

The light of the early carbon-filament bulbs was harsh and yellowish. Yet when mounted in shaded lamps it was a welcome improvement over oil and gas. Later, the tungsten filament and frosting gave electric light greater whiteness and softness. In time, fluorescent lights were developed which combined great economy with almost ideal illumination.

Among the greatest improvements in home illumination has been indirect lighting. Light from either incandescent or fluorescent lamps is thrown on a light-colored wall or ceiling. From there it is reflected and diffused over a large part of the room. Such lighting is far easier on the eyes than direct illumination. Skillfully handled, it can be used to produce pleasing patterns of light and shade as a decorative feature of a room.

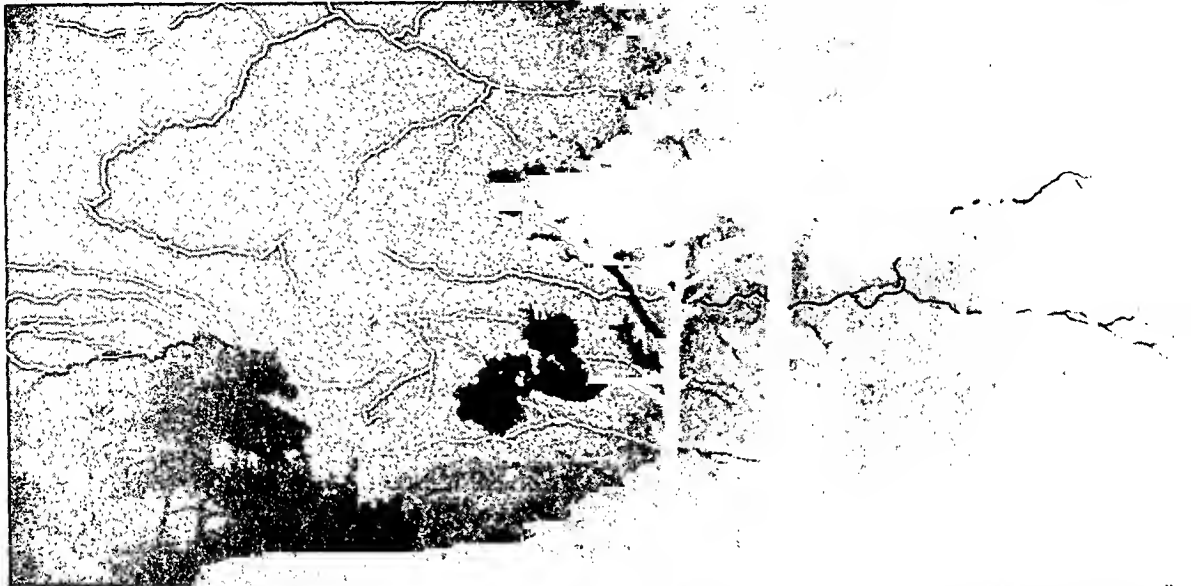
Introduction of electric lighting also gave rise to a new profession, that of the *lighting engineer*. He determines the amount of light needed for particular jobs in offices, factories, or homes. Then he decides on the placement and intensity of lights which will give ideal working conditions and greatest economy. (See also Electric Light and Power; Lamps.)

MODERN LIGHTING IN THE HOME



In the modern living room (top), fluorescent tubes concealed in the cove where the walls meet the ceiling shed a soft light over the entire room. This is supplemented by similar lights behind the sofa and by incandescent floor lamps. The "model" kitchen (bottom) takes full advantage of fluorescent lighting over working spaces. A ceiling fixture supplies general illumination.

How THUNDERCLOUDS Make the LIGHTNING Flash



This magnificent display of forked lightning may, for the moment it lasts, use much more energy than can be generated in all the electric powerhouses of the United States. Part of the branching is to the ground, and the rest is between clouds.

LIGHTNING. In ancient days, men believed that lightning was a fiery arrow hurled by an angry god—Zeus or Jupiter or Thor. We still speak of *bolts* (meaning “arrows”) of lightning. Our word “thunder” comes from the name of the Anglo-Saxon god Thunor. But today we know that lightning is really a gigantic discharge of electricity.

Modern knowledge about lightning began with Benjamin Franklin. In 1752 he showed that lightning was an electrical discharge (see *Electricity*). During the 19th century, studies of spark discharges added more knowledge; but no great progress was made until after the first World War. Then high-speed photographic methods showed how lightning flashes occur, as explained later in the article.

How Electric Charges Make Sparks

How electrical forces make lightning can be shown by the effect produced by scuffing on a thick carpet in dry weather. After scuffing, touch a metal fixture. A tiny spark will jump between your finger and the metal.

What makes the spark? It happens because all matter is made of particles charged with two kinds of electricity, positive and negative (see *Atoms*). The positive kind exists largely in the cores of atoms. The negative particles, called *electrons*, are around the outside. The two kinds of particles strongly attract each other. If they are separated by any means, they have a great tendency to reunite.

In the experiment described, the scuffing tore loose some of the electrons from the carpet, and they gathered on your body. In scientific terms, your body gained a *negative charge*. Upon touching metal, your body was *discharged* by the tiny spark, as explained in the article on *Electricity*.

FACTS ABOUT A LIGHTNING FLASH

Length—From 500 feet to more than two miles.

Speed—More than 6,200 miles a second while one flash lasts.

Duration—From 5 millionths to 5 ten-thousandths of a second. The glow lasts about 100 millionths of a second longer; the impression remains longer in the eyes.

Width—At the start, from one-third of an inch to an inch; at the peak, about a foot.

Heat—As much as 54,000°F. (30,000°C.).

Power—Electrical pressure, from 100 million to billions of volts; may discharge 200 coulombs of electricity. Total power may be more than a trillion kilowatts. (For explanation of terms, see *Electricity*.)

How a Cloud Builds up a Flash

Lightning is caused by a similar discharge on a gigantic scale. The charges which make it are built up by churning air inside a thundercloud. (For a diagram of such a cloud, see *Storms*.) Scientists are not sure about many details of the process; but they believe that water droplets in the cloud have negative charge (electrons) outside and positive charge inside. Churning inside the cloud tears electrons loose, leaving the drops with positive charge. Then air currents carry the positive and negative charges to different parts of the cloud.

When the separated charges grow strong enough, they break down the resistance of the air between them. The electrons rush to join a positive charge and heat the air along the path or paths they follow. The heated air glows like the gas in a neon tube. This glow is the so-called “flash” of lightning.

This simple process accounts for lightning within clouds or from cloud to cloud. A flash between a cloud and the earth is built up in a more complicated way, as explained later in the article. But the basis

of the process is this: a strong negative or positive charge in the base of a cloud induces an opposite charge below it on the earth. Electrons start moving, first singly and then in swarms, from the region of negative charge to the positive. They knock electrons from air particles as they go, and gradually build up a channel or channels of charged particles between the cloud and the earth. Once a passage is complete, a tremendous surge of electrons swarms along it, causing a lightning flash.

What Causes Thunder

The thunder after a lightning flash is not caused by air rushing into a vacuum caused by the flash, as men once thought. Rather, the flash heats the air and it expands with explosive violence. The so-called thunderclap is the noise of the "explosion." Echoes of the clap may cause considerable rumbling.

Many people fear thunder more than the lightning flash. But any damage that occurs is caused by the flash; and it is over before the thunder is heard. The article on Sound explains how lightning and thunder can be used to tell how far away a flash occurs.

Destructive Power of Lightning

Lightning can do extensive damage and kill men and animals because of the tremendous energy in a flash. A single flash may use a trillion kilowatts of power. When such a flash hits a tree, sap flashes into steam wherever the energy passes, and the steam blows off limbs or even splits the trunk. When lightning strikes sandy ground, it melts the sand itself along a course that may strike several feet down. This forms long, glassy tubes called *fulgurites*.

In an average year, lightning kills some 400 people and causes some 20 million dollars' worth of damage in the United States. Most of this loss of life could be avoided by obeying a few simple rules. Lightning, we know, seeks the shortest path between its parent cloud and the ground. Church steeples, flagpoles, and lone trees provide a short path, and lightning tends to strike them. Hence we should stay away from them during thunderstorms. Persons on mountain tops or on level plains should lie down. People inside buildings are relatively safe. Lightning usually travels down the outside of a building or along water pipes or other metal paths. Steel-framed skyscrapers are especially safe, for they act as giant lightning rods.

Why Lightning Rods Give Protection

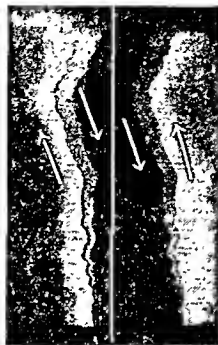
The lightning rod, invented by Benjamin Franklin, is a metal wire or rod having its tip well above the protected structure and its base in the ground. The rod does not protect, however, by providing a path to the ground for lightning, as some suppose. It is the point that provides the protection because electric charges leak readily from points. When induction from an overhead cloud builds up a charge upon a building, some of the charge leaks off as a feathery "brush discharge." This weakens the attractive force between the ground and cloud charges, and no stroke occurs.

To insure protection, lightning rods should be installed by experts. Structures such as oil tanks which

are likely to take fire are protected best by a series of rods, connected with wires to form a sort of cage. A good rod protects a horizontal area of from two to four times its height.

Scientific Studies of Lightning

For many years, the speed of a lightning flash blocked scientific attempts to study it by photography. The whole flash would be complete from end to end in the time it took to get a photograph. This difficulty was overcome after the first World War by a camera developed by Sir Charles V. Boys. It took pictures with lenses mounted on opposite sides of a whirling disk. By comparing the amount of lag with the speed of whirl, the speed of stroke could be learned. Also, when successive strokes occurred in the same channel within a small fraction of a second, the camera separated the images.



The whirling lenses of the Boys camera spread out the double stroke of a lightning flash. The two pictures, taken from opposite sides of the camera, are mirror images of each other.

Such pictures, taken by B. F. Schonland in South Africa and other investigators in the United States and Europe, show how a lightning stroke develops by several steps. In mountainous

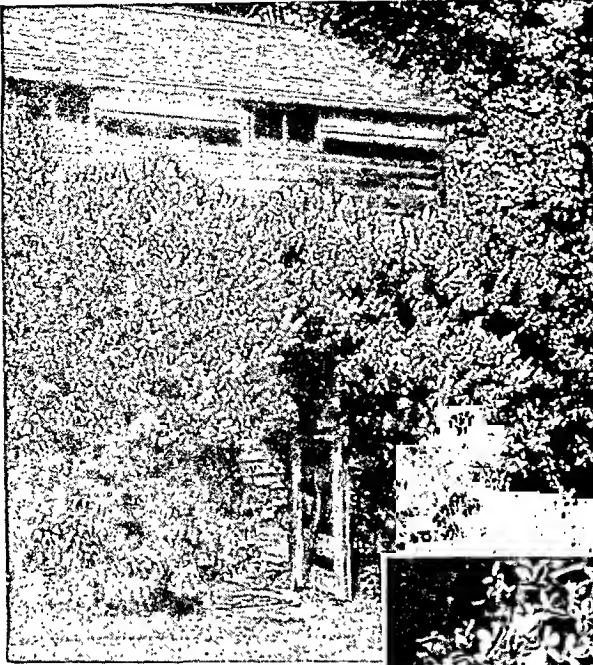
country, strokes may build up between a negative charge in the ground and a positive charge in a cloud. Otherwise the negative charge usually is in the cloud.

At the start, single electrons are drawn toward the positive charge and they electrify air particles along the way, as already told. Since charged particles are called *ions*, the air is said to be *ionized* with a positive charge. At first the ionized air particles rapidly capture electrons and lose their charge. But this very attraction increases the rush of electrons and the ionization.

Soon a channel called a *streamer* develops, either along a single line or along branching lines of weakest air resistance. It has electrons massed at one end and positive particles at the other drawing in more electrons. The cloud and ground charges support growth of the streamer until it bridges the gap between them. Then a surge of electrons, called the *return stroke*, sweeps along the entire channel and ionizes it completely. Thereupon the main mass of electrons discharges, causing intense heat and glow. This is the main lightning flash. It lasts only a tiny fraction of a second; but other charged parts of the cloud may use the same channel, causing as many as forty successive flashes.

Powerful branched flashes are called *chain* or *forked* lightning. The *St. Elmo's fire* seen on ships as a glow in the rigging is a leakage, or brush discharge, from sharp points. *Sheet* or *heat* lightning results from a discharge inside a cloud, or is a reflection from clouds of a distant flash. The rare *ball* lightning is seen as a ball of fire which rolls over the ground and explodes. Its cause is not known.

LILACS BLOOM IN A DOORYARD



LILAC. Each spring the lilac brings color and fragrance to lawns and parks in north temperate countries. Its pyramidal clusters of blossoms are white or pinkish purple, its leaves a bright glossy green.

The shrub is native to eastern Europe and Asia. The colonists brought it to America. Lilacs are often planted in groups to form masses of shrubbery or hedges. When planted singly and given plenty of room, they grow full and tall, reaching a height of 10 to 25 feet. Cultivation often produces double varieties. The shrub is hardy, grows rapidly, and flowers profusely. It may become choked with suckers at the base unless they are cut away. The suckers can be planted elsewhere to start new bushes. Cabinetmakers value the wood of certain species for turning and for inlay work.

Some famous lilac gardens which display several hundred varieties are the Lemoine gardens at Nancy, France; the Arnold Arboretum at Jamaica Plain, Mass., near Boston; the gardens in Highland Park, Rochester, N. Y., and Lilacia Park in Lombard, Ill.

Lilacs belong to the olive family, *Oleaceae*. The name of the genus, *Syringa*, meaning "little pipe," was given it because lilac stems were once hollowed out and used as pipestems. *Syringa* is also the common name for the mock orange, an unrelated shrub of the genus *Philadelphus* (see *Syringa*). Scientific name of the common lilac with purple flowers, *Syringa vulgaris*; of the Persian lilac, a smaller shrub with white flowers, *Syringa persica*. Leaves, opposite; flowers, large erect panicles of small flowers having a bell-shaped calyx, a 4-lobed cylindrical corolla, and 2 stamens attached to the mouth of the tube.

LILLE (*lêl*), FRANCE. During the Middle Ages, Lille, in northern France, grew up about a feudal castle on the Deule River, seven miles from the

present Belgian frontier. Today it is noted for its textile and iron manufactures, its Palais des Beaux Arts, which has one of the richest picture galleries in France, and its library with thousands of rare editions and valuable historical documents.

For centuries Lille has been noted for the making of fine linen, linen and damask cloths, and flax thread for lacemaking and for sewing. Indeed, "lisle" thread gets its name from the city. Cotton manufactures are also important, especially the making of ribbons and velvet. The city also has locomotive and bridge-building works, and manufactures beet sugar, chemicals, tobacco, and soap. Among its educational institutions is Lille University where the great Louis Pasteur was teaching when he did so much to revolutionize science and to aid agriculture.

Lille's history has been stormy. A leading city of medieval Flanders, it was ruined and rebuilt in the wars between the Flemish and the French in the 13th century. Later it fell under Austrian rule, then Spanish, and was not restored to France till 1667. In the War of the Spanish Succession it was taken by England and its allies but was returned to France by the Treaty of Utrecht (1713). In 1792 it successfully withstood a nine-day Austrian bombardment. In the world wars of the 20th century it was twice seized by Germany. As a key



Top, this profusion of blossoms is typical of the lilac. Bottom, the blossoms grow in clusters so that the florets may attract insects.

city of German-occupied France in the second World War, it was bombed by the British air force. Population (1946 census), 179,778.

LILY. The white lily stands for purity, and artists for centuries have pictured the angel Gabriel coming to the Virgin Mary with a spray of lilies in his hand, to announce that she is to be the mother of the Christ child. The lily is also the sign of the Resurrection and as such is the Easter flower. In Bermuda and the United States great fields of shining lilies are grown in the early spring to adorn our churches and homes at Easter time. In contrast to the fair white lilies are many colored varieties, gorgeously arrayed in crimson, scarlet, orange, and golden tints. In all, several hundred species of lilies are known.

Lilies grow only in the Northern Hemisphere, most of them in the temperate zone. The lovely white Madonna lily of southern Europe was used for years as the Easter lily. But it often failed to bloom in time for Easter, so Bermuda lilies were used. Imported bulbs were grown in greenhouses for this purpose.

Before the second World War, about 90 per cent of the bulbs were imported from Japan and only about 10 per cent from Bermuda. The bulbs are now grown commercially in Washington, Oregon, California, Georgia, Florida, and Louisiana.

Among the commoner varieties of colored lilies are the tiger lily, a native of Japan, which bears dark-red purplish-spotted flowers; the Siberian coral lily, which has brilliant scarlet flowers; the gold-banded or Japan lily, with yellow-banded purple-spotted white flowers; and the showy lily, also a Japanese species, with red-dotted pinkish flowers. The giant lily of India, which has huge funnel-shaped purple-stained flowers, grows from 10 to 14 feet high, while the other species range from 2 to 5 feet. Wild lilies of North America are the Turk's-cap, Canada, and wood lilies (for illustrations in color, see Flowers).

The lily family (*Liliaceae*) is an important group, since so many of its members, including asparagus, onion, leek, garlic, chives, etc., are used for food. Some of the garden flowers of this family are the lily of the valley, tulip, hyacinth, and tuberose.

The lily genus (*Lilium*) is marked by an erect stem, narrow sessile leaves, alternate, scattered, or whorled, and large showy bell-shaped or trumpet-shaped 6-parted flowers, enclosing 6 stamens and a seed-vessel. The beautiful white calla lily or arum lily (*Richardia aethiopica*) with its brilliant yellow spadix, belongs to an entirely unrelated genus. Many other so-called lilies, as the belladonna lily, belong to the Iris or Amaryllis groups. Scientific name of the Madonna lily, *Lilium candidum*; of Bermuda or Easter lily, *Lilium longiflorum*.

LILY OF THE VALLEY. Nestling among the broad cool leaves, the dainty white bells of the lily of the valley sway back and forth, wafting to the breezes their delicate perfume. This well known plant is native to Europe, Asia, and America, growing in shady damp spots and blossoming in the spring months. The smooth, linear-shaped leaves rise directly from the roots and in their midst the 6-toothed bells nod on their slender green stems. There are few plants more satisfactory than the lily of the valley. It is cultivated in hothouses throughout the year, and when planted in our gardens it soon escapes and runs wild along shady roadsides, its graceful "bells" nodding in the breeze. Scientific name of the lily of the valley, *Convallaria majalis*.

LIMA, PERU. Founded by the *conquistador* Francisco Pizarro in 1535, Lima, the "city of kings," was for centuries the capital of Spain's vast realm in South America. Remnants of its proud past linger to give the busy, modern capital city a distinctive character.

The heart of the old city is the broad Plaza de Armas. Beside it rises the ancient cathedral. There Pizarro's shriveled body lies exposed to view in a glass coffin. The present government palace also flanks the Plaza. The narrow crowded streets of the neighboring shopping district still hold crumbling churches and colonial mansions that reflect the wealth and grandeur of viceregal society.

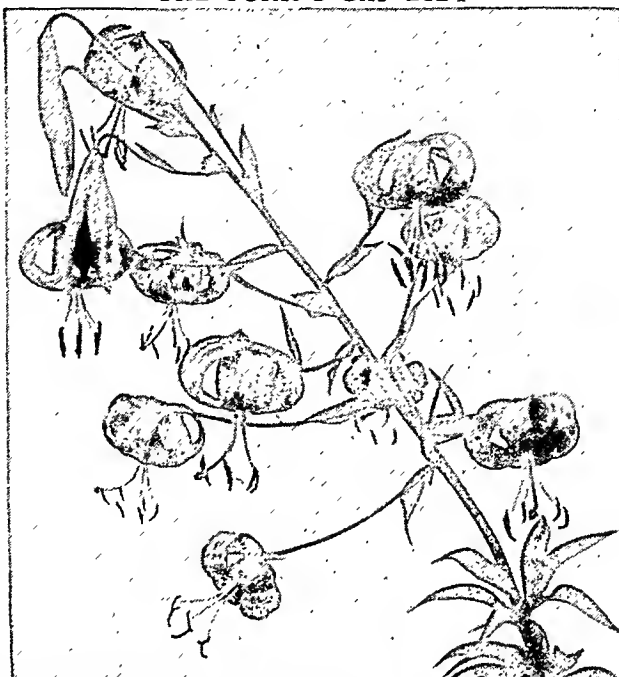
Lima is the seat of the oldest university in South America, the national University of San Marcos. It received its charter from Emperor Charles V in 1551. The National Museum of Archeology cherishes rich remains of the pre-Inca Indian civilization in the area. Here

are the exquisite textiles, quaint pottery, tools, and mummified bodies of long dead rulers.

The city is Peru's sole metropolis and the focus of its political, social, cultural, commercial, and economic life. Its population has doubled in recent decades as the country has developed its natural resources (see Peru). Handsome suburbs have been built and wide avenues constructed. Its factories produce cotton and woolen textiles, sugar, foods, beverages, cigarettes, furniture, shoes, and other goods for local use. Lima's port, Callao, six miles away on the Pacific, handles most of Peru's foreign trade. Limatamba airport is a principal stop on the air route between the Americas.

Lima lies at an altitude of 500 feet, near the center of the arid Peruvian coastal plain. The Rimac River supplies water for irrigation. Though the city is only 12 degrees south of the equator, the chill Humboldt Current of the Pacific Ocean cools the air. The annual mean temperature is a low 66.7° F. Rain seldom falls, but fogs are common in winter. Numerous earthquakes have shaken the region. Population (1940 census), 520,528; (1949 est.), 628,821.

THE TURK'S-CAP LILY



This orange-red flower is one of the common wild lilies of the United States.

THE LILY OF THE VALLEY



The fragrant lily of the valley is a favorite among spring flowers.

LIME. When we speak of lime, we commonly mean quicklime. This is a white alkaline substance having considerable power to corrode, or "eat," animal tissues. Quicklime is usually obtained by roasting limestone in a kiln or furnace at about 1800° F. This changes the calcium carbonate of limestone (see Limestone) to calcium oxide (CaO), or quicklime. Since quicklime is alkaline and chemically active, it is useful in many processes such as removing hair from hides and correcting acidity in soils and various liquids such as sugar-cane juice. Another common use is in mortar and plaster making.

To make mortar, lime is *slaked* by adding water. This changes the oxide to a hydroxide (CaOH). Coarse sand, cinders, or pulverized stone is mixed in, and the mixture is used to bind or cover bricks or stones. As the mixture dries, it absorbs carbon dioxide from the air to form calcium carbonate, and also combines with the silica of the sand to form calcium silicate. These substances bind the bricks or stones together. Quicklime exposed to air is ruined for mortar making, by absorption of carbon dioxide (air-slaking). Lime plaster is made by mixing hair with water-slaked lime.

Pure calcium oxide is formed by melting limestone in an electric furnace. Under intense heat this gives a strong white light. Lime lights (also called calcium lights or Drummond lights) were formerly used for stage lighting.

A solution of calcium hydroxide in water is called *limewater*. This is used in medicine to correct acidity, to prevent milk from curdling in large lumps, and with certain oils as a liniment for burns. Limewater reveals the presence of carbon dioxide by becoming cloudy. It is an antidote for poisoning by mineral or oxalic acids.

LIMERICKS. Rudyard Kipling has given us the following specimen of nonsense verse called a limerick:

There was a small boy of Quebec,
Who was buried in snow to his neck;
When they said, "Are you friz?"
He replied, "Yes I is—
But we don't call this cold in Quebec."

Limericks became popular after Edward Lear, an English artist, published (1846) a collection he had written to amuse young friends. Writing limericks is still a favorite diversion, especially for newspaper contests. In such contests four lines are given, and a prize is offered for the best fifth line.

The limerick verse form originated, it is said, at Irish parties. Each guest would make up a line of nonsense verse in this meter; then the whole company joined in a chorus with the words, "Will you come up to Limerick?" Limerick is the chief port on the west coast of Ireland.

LIMESTONE. Without help from chemistry and the microscope we might find it hard to believe that the rock called limestone came from sea shells and corals. But chemistry tells us that shells and corals owe their stiffness to calcium carbonate (CaCO₃), of-

ten called "carbonate of lime." Limestone also is mainly calcium carbonate; and the microscope enables us to see the remains of animals which formed it.

Hence we know that limestone is sedimentary rock, formed from shells and other "limey" material in the oceans that in past ages covered the limestone regions. Outstanding regions of this sort in the United States are the present site of the Rocky Mountains, the valleys of the Mississippi, Ohio, and St. Lawrence rivers, and much of Texas (see Geology).

Limestone is one of our most useful rocks. It is our chief source of lime; it is used in making portland cement (see Cement) and in smelting iron and lead (see Iron and Steel); and it is an important building material. It wears better than sandstone, is more easily shaped than granite, and weathers from nearly white to a beautiful gray. Oolitic limestone, quarried in Lawrence, Monroe, and Owen counties in Indiana, is particularly fine building stone. Its texture resembles fish eggs, hence its name, from the Greek *oion*, meaning "egg." Bedford, Ind., is a noted limestone quarrying center. (See Quarrying.)

Crushed limestone is used on macadam roads. Farmers use ground limestone to neutralize soil acids that attack calcium and other salts needed by plants. Such protection is given naturally when soils have a limestone foundation.

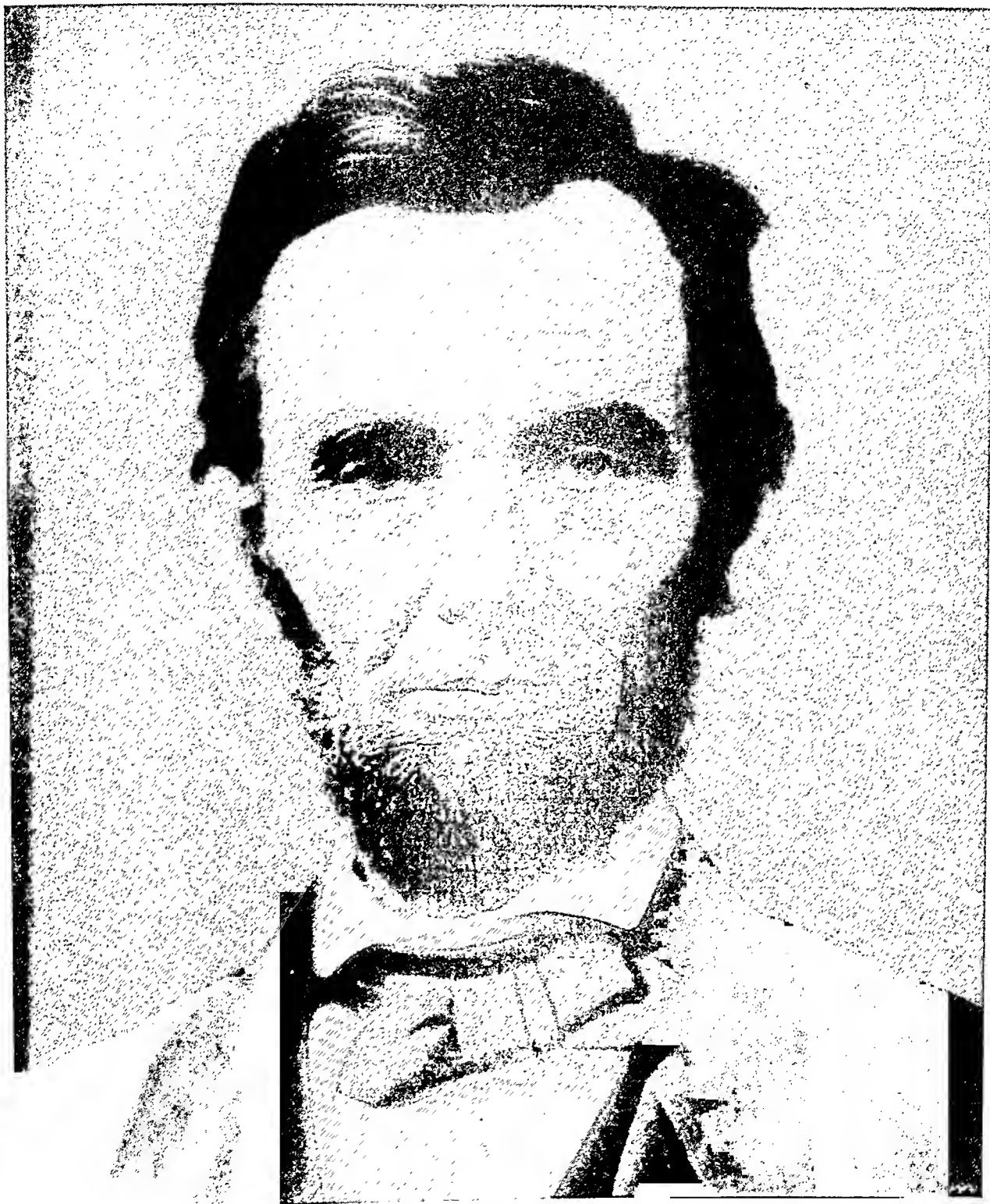
Travertine limestone and calcareous tufa consist of calcium carbonate deposited from hard water. Stalactites and stalagmites in caves are formed in the same way. Limestone rock is often riddled with caves because water and carbon dioxide dissolve the limestone. Chalk is a soft white limestone containing the shells of foraminifera (see Chalk). Marble is a metamorphic, or transformed, limestone crystallized by pressure and perhaps heat (see Marble).

LIME TREE. No flavor is more acceptable in a cooling drink on a hot day than a dash of lime juice. This comes from a fruit like a small, green lemon. Limes are smaller and rounder than lemons, and have a thinner rind and more sharply acid juice.

The lime tree is a native of southeastern Asia, particularly India. Most of the limes sold in the United States come from plantations in the West Indies, Mexico, and Florida. The trees, which do not grow more than eight feet high, start bearing in the third year and attain full growth when six or seven years old. Since the fruit spoils readily, it is shipped green. A cross or hybrid between the lime and the kumquat, called a limequat, is hardier than the lime and yields more juice and pulp.

Lime juice, often concentrated by evaporation, is marketed both for flavoring and as a source of citric acid. British sailors are called "lime-juicers" or "limeys" because of the British law requiring a regular allowance of lime or lemon juice at sea to prevent scurvy (see Vitamins).

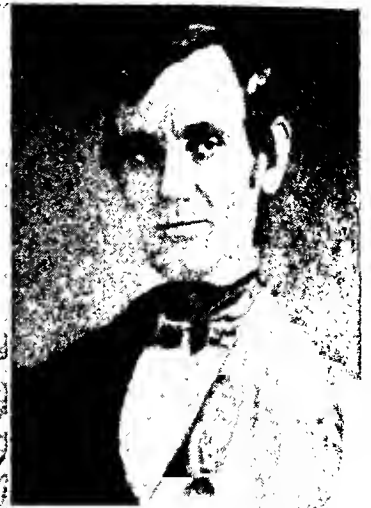
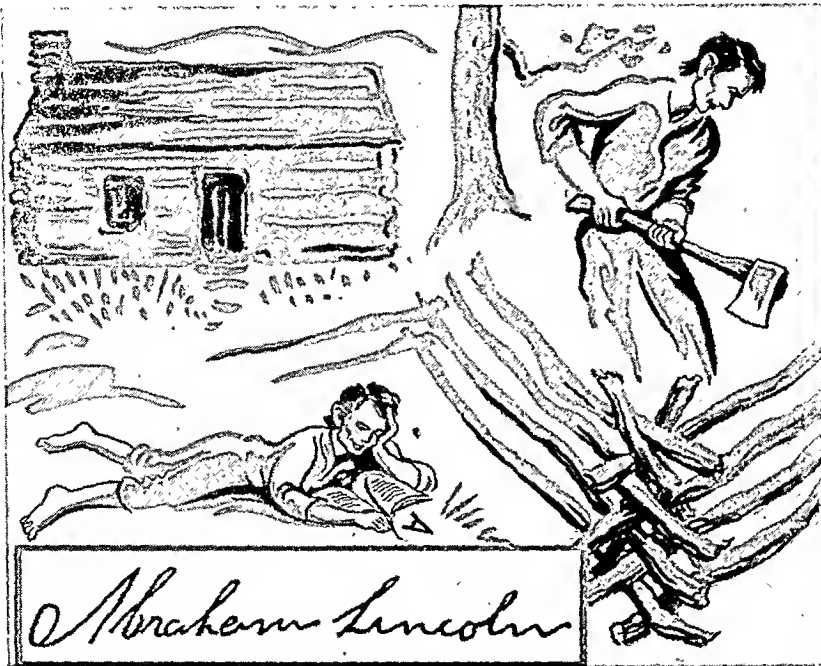
The name lime tree is also applied to various species of linden (see Linden). Scientific name of the true lime tree, *Citrus aurantifolia*.



The Life STORY of ABRAHAM LINCOLN

LINCOLN, ABRAHAM (1809–1865). Abraham Lincoln was the 16th president of the United States. At the time that he took office, seven states had just broken away from the Union. Civil war was about to begin. He guided the nation until the war was over, the states were united again, and the nation was saved.

The story of Lincoln's life is the story of a boy who wanted to learn and a man who never grew too old to keep on learning, both from people and from books. All his life, Abraham Lincoln was a "learner." So it was that he rose to greatness and honor from a very poor and humble beginning.



This is the earliest known photograph of Lincoln. It was taken in Springfield, when he was 37. The signature at the left is one that young Abe wrote in his copybook when he was 14 years old.

Abraham Lincoln's father could not read or write more than his own name—Thomas Lincoln. He was working as a carpenter in Elizabethtown, Ky., when he married Nancy Hanks. She had little more education than her husband. Sarah, their first child, was about two years old when they moved to a half-cleared farm near the neighboring town of Hodgenville.

A Child of Kentucky

On the twelfth of February, 1809, in a one-room log cabin on that farm in Kentucky, their son Abraham was born. He was named for his grandfather Lincoln, who had come from Virginia to Kentucky in 1782. His youngest son, Thomas, was then a baby. A few years later, Grandfather Lincoln was killed by an Indian, for Kentucky was then a wilderness. Settlers had since driven out the Indians, but the woods and hills surrounding the Lincoln cabin were still full of wild game. Little Abe's easy-going father much preferred hunting to working on the farm.

The Lincolns' next home was another farm, eight miles from Hodgenville in Knob Creek Valley. There Abe learned to plant and hoe and husk corn, to help with chores, and to write his name and say his A B C's in a few weeks at school. He lived there until he was seven years old; then the Lincolns left Kentucky.

Backwoods Boy of Indiana

In 1816 Thomas Lincoln took his family across the Ohio River into the backwoods of Indiana. On Little Pigeon Creek, 16 miles from the Ohio, he had bought uncleared land. There the family camped out all winter in an open shed until he could cut the logs and build a cabin for them. In 1818, when Abraham was only nine, Nancy, his mother, died.

A year passed. Thomas Lincoln returned to Kentucky, married Mrs. Sarah Bush Johnston, a widow, and brought her back with her three children to the dirty cabin in the wilderness. She was brisk and ener-

getic and soon had the cabin neat and everything in order. Though uneducated herself, she took great interest in helping Abraham, who was so eager to learn. He often said later that she was "the best friend I ever had." She made his father send him to school and so, though he went less than a year in all, by the time he was 14 he could read and write and figure a little. Often he read by the light of the fire at night, writing what he wanted to remember on the back of the big wooden fire shovel. His first books were the Bible, 'Aesop's Fables', and 'Robinson Crusoe'.

At 15, very tall and strong for his age, he was sent by his father to work as a hired man on a near-by farm. Usually, while he was plowing or splitting fence rails, he had a book tucked in his shirt to read while he ate his lunch or rested. When a book, 'The Life of George Washington', which the farmer had loaned him was accidentally damaged by rain, he husked corn three days to pay for it.

In the next few years he worked on a farm bordering the Ohio River. He built and ran a ferryboat to carry passengers out to the river steamers; he also clerked part time in a store at Gentryville. There he amused the customers with stories, wrote letters for them, read the newspapers aloud, and was always ready with a speech. He became curious about the law, borrowed a book on the laws of Indiana, and studied it at night after his work was done. Whenever he could, he also went across the river to hear cases tried in a Kentucky court.

At 19 he made an exciting trip down the Mississippi River on a flatboat. He and the son of the man who hired him took a boatload of farm products to be sold in New Orleans. There, for the first time, Lincoln saw Negroes being auctioned off in the slave markets. Slavery was then lawful in all of the United States that lay south of the Ohio River.

Among the Lincoln memorials that may be visited are his log-cabin birth-place near Hodgenville, Ky.; the grave of his mother in Gentryville, Ind.; the restored log-cabin village of New Salem, Ill.; and his residence for many years and his tomb in Springfield, Ill.:



Returning home to Indiana, he continued to work by the day, giving what he earned to his father until he was 21. Then, in February 1830, the Lincolns and their kinsfolk set out by ox team and covered wagon for a new home in Illinois.

Life in New Salem, Illinois

In the summer of 1831, young Abraham Lincoln, six feet four inches tall, arrived in the log-cabin village of New Salem, Ill., on the Sangamon River. In the past year he had gone again to New Orleans. He had built a cabin and split fence rails for his father's farm in Coles County. Then he had left home.

For six years he was to live in New Salem, growing by study from a farm hand to a lawyer. By his honesty, his courage, his warm, kindly heart, and his droll sense of humor, he was to make many friends.

He began by building a log store and clerking in it. His employer boasted about Lincoln's strength, until Abe had to prove it by beating Jack Armstrong, leader of a tough gang, in a wrestling match. The next spring, 1832, he enlisted for the Black Hawk War and was pleased when the gang elected him captain of their company. He served three months.

On his return, he was out of a job. The store had failed. He ran for election as representative to the state legislature from Sangamon County, but lost. He borrowed \$1,000 to start another store with a partner named Berry. That failed, leaving him in debt. He had been made postmaster of New Salem in 1833, but the pay was small. He had to go back to doing odd jobs, until, at last, the chance came to be a surveyor. Then he borrowed books and studied day and night. Six weeks later he was laying out new towns and roads and making friends in Sangamon County.

In 1834 they elected him to represent the county in the state legislature (and again in 1836, 1838, 1840). The summer after his first term brought the sudden

sad death of his sweetheart, Ann Rutledge. The next summer he was studying law, walking 20 miles from New Salem to Springfield to borrow law books from John T. Stuart, whom he had met in war and in the legislature. In 1837 he became Stuart's law partner in Springfield, the new capital of Illinois.

Legal Career in Springfield

The law firm of Stuart and Lincoln dissolved in 1841. For the next three years Lincoln was a partner of Stephen T. Logan. During that time he became as much interested in politics as he was in the law. Another lawyer, Stephen A. Douglas, was Lincoln's chief rival. They both admired Mary Todd, daughter of a Lexington, Ky., banker. She favored Lincoln, predicting he might some day be president.

On Nov. 4, 1842, Mary Todd married Abraham Lincoln. They were still living in one room at the Globe Tavern when, in 1843, Robert Todd was born, the first of their four sons. The next year, a plain white frame house on the edge of town became their home. There Edward, William, and Thomas were born in 1846, 1850, and 1853 respectively.

In 1847 Lincoln went to Washington, elected as a representative to Congress. War with Mexico was on. He spoke against it, offending the people who had elected him, and so came home at the end of his term, 1849, fearing his career in politics was over.

From then on, for more than five years, Lincoln gave his full attention to the law. Each spring and fall he traveled about with a judge and other lawyers, "riding the circuit" from one county seat to another, trying cases. Wherever they went, he was most popular—able to make the jury weep or the courtroom rock with laughter. One of his important cases was defending the Rock Island Railroad in a damage suit. And a famous one was the murder trial of Jack Armstrong's son. In 1844 he had made William Herndon

LINCOLN'S FAMILY IN THE WHITE HOUSE



Of Lincoln's four sons, only Robert, the eldest (standing), lived to maturity. Edward, the second, died in infancy. William, who sits next to his mother, died in the White House at the age of 12. Thomas (Tad), the youngest, died in Chicago at 18.

his partner. The firm of Lincoln and Herndon was to end only at Lincoln's death.

It was the question of slavery that brought Lincoln back into politics. In 1856 he helped organize the new Republican party in Illinois, formed by those who wished to stop the spread of slavery. Lincoln disapproved of interfering with it in any state where it was still lawful. But he was alarmed by the Kansas-Nebraska Act of 1854, which gave the people of each new territory the right to make it either slave or free. This law had been supported by Stephen A. Douglas, who in 1858 was up for re-election as Democratic senator from Illinois. Lincoln, the Republican candidate, challenged Douglas to a series of debates.

The Lincoln-Douglas Debates caused great excitement and

brought Lincoln national fame (see Lincoln-Douglas Debates). In one of the debates, he trapped Douglas into answering a question in a way that pleased free Democrats of Illinois (who re-elected him for senator) and antagonized all Democrats who stood for slavery.

Therefore, in 1860, when Douglas ran for president, they put up another candidate. Then, with the Democratic votes divided, Abraham Lincoln, promoted by the Republicans as "Honest Abe, the rail splitter" won the election. Alarm spread through the Southern states. Not knowing Lincoln, they believed that no Republican president would uphold their rights and that their only hope was to secede from the Union.

**Lincoln as
Wartime President**

By March 4, 1861, Lincoln's inauguration day, there had been

LINCOLN'S ADMINISTRATIONS (1861-1865)

Fort Sumter fired on and Civil War begun (April 12, 1861).

Lincoln calls for troops (April 15).

Union defeat at Bull Run (July 21).

'Trent' Affair (Nov. 8) threatens war with England.

'Monitor' and 'Merrimac' engagement (March 9, 1862).

Grant's victory at Shiloh (April 6-7).

Slavery abolished in District of Columbia (April 16).

New Orleans taken by Farragut (April 25).

McClellan's Peninsular Campaign (March to July).

Lincoln attacked for repressive measures.

Democrats gain in Congressional elections.

Emancipation Proclamation (Jan. 1, 1863).

West Virginia admitted as a State (June 20).

Lee defeated at Gettysburg (July 1-3).

Vicksburg taken by Grant (July 4).

Draft riots in New York City (July).

Grant made commander-in-chief (March 12, 1864).

Sheridan wastes Shenandoah Valley (October).

Sherman's march through Georgia to the Sea (November-December).

Nevada admitted as a State (Oct. 31).

Lincoln re-elected (Nov. 8) against McClellan.

Lee surrenders at Appomattox (April 9, 1865).

Lincoln shot (April 14).

many threats made against his life. In Washington, D. C., soldiers guarded his way to the Capitol, where he took the oath of office. Seven states had then seceded. In his address, Lincoln urged them not to act in haste, assuring them that there would be no war unless they started it. On April 12, however, Fort Sumter, a United States fort in the harbor of Charleston, S. C., was fired upon and war began. Four more states seceded, making 11 in all. They formed the Confederate States of America, also called the Confederacy (see Civil War, American; Confederate States of America).

As the Southern states seceded, some of the best officers in the United States Army resigned. Among them was Robert E. Lee, who felt that his duty lay with his native state, Virginia. Lincoln had great difficulty at first in finding capable generals to command the Union forces. Feeling his own lack of military knowledge, he got books and, as always, made a point of learning what he needed to know.

He had sent out a call for 75,000 volunteers. As the raw, untrained troops began to arrive, they went into camp just across the Potomac River from Washington, in northern Virginia. Their object was to capture Richmond, Va., the Confederate capital. In July they advanced a few miles, met the Confederate army at Bull Run in the first battle of the war, and were defeated. The northern newspapers were harsh in their criticism of Lincoln, his Cabinet, and his generals. All through the war, Lincoln was to be subjected to ugly attacks and unjust criticism. He was to bear it all with patience and no feeling of bitterness, acting by his own words: "Let us have faith that right makes might, and in that faith let us to the end dare to do our duty as we understand it." Lincoln's duty, as he saw it, was to save the Union.

The Emancipation Proclamation

During 1862, Lincoln struggled with the problem of freeing the slaves. He had long realized that the

LINCOLN AT ANTIETAM



President Lincoln met with his officers on Oct. 2, 1862, shortly after the battle of Antietam. Facing Lincoln is Gen. George B. McClellan, commander of the Army of the Potomac.

question of slavery must be settled if the United States, founded on the principles of liberty and equal rights for all, was to survive as a nation.

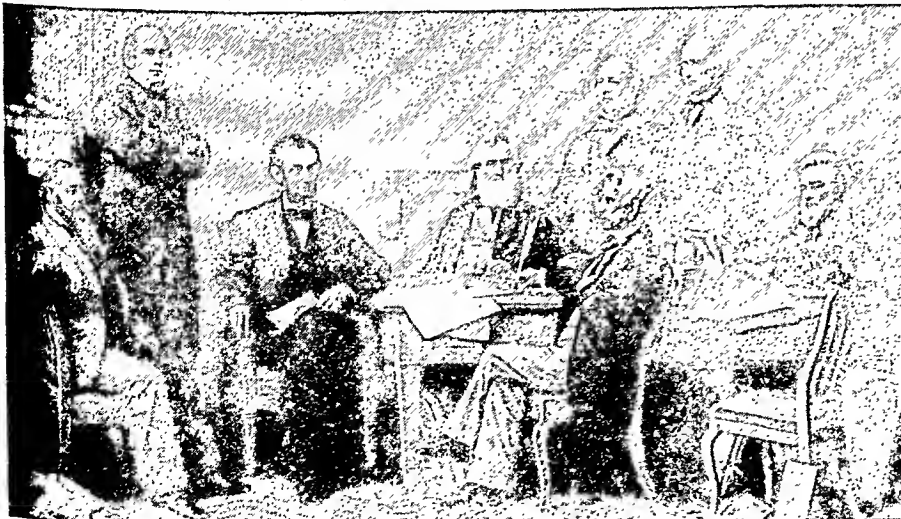
"A house divided against itself cannot stand," he had said. "This nation cannot exist permanently half slave and half free." Yet, in freeing the slaves, he was determined to be fair and just to their owners.

In March he proposed to Congress that money be used to purchase the freedom of the slaves in those slave states that had remained loyal to the Union. To his disappointment, the plan failed.

For the states which had seceded, he worked out another plan, which he hoped would hasten the end of the war. He offered any of them three months to return to the Union. If they did not, their slaves would "then, henceforth and forever be free."

His Cabinet approved of issuing that proclamation after the next Union victory. All summer passed with no victory until September 17. Then the Confederate army, marching north, was stopped in the battle of Antietam. Lincoln issued the proclamation and waited. No states responded. So, on Jan. 1, 1863, Lincoln signed the Emancipation Proclamation (see Emancipation Proclamation).

LINCOLN PRESENTS THE EMANCIPATION PROCLAMATION



Lincoln read the first draft of his Emancipation Proclamation to his Cabinet on July 22, 1862. The Cabinet members were (left to right) Stanton, secretary of war; Chase, treasury; Welles, navy; Smith, interior; Blair, postmaster general; Bates, attorney general; (in front) Seward, state.

In July 1863 the Confederate army, again marching north, was met and defeated at Gettysburg, Pa., in the only battle of the war fought on Northern soil. On November 19 the battlefield was dedicated as a national cemetery, and Lincoln made his short and very beautiful Gettysburg Address.

The Last Year

In the spring of 1864, as the fourth dreadful year of war was beginning, Lincoln summoned Gen. Ulysses S. Grant to Washington and gave him supreme command of the Union armies. With the capture of Vicksburg in July 1863, Grant had brought to a successful finish a long campaign to gain control of the Mississippi River down to New Orleans. Now as he went to join the army in Virginia, Lincoln had, at last, a general in whom he felt confidence. Grant, he was sure, would succeed in bringing to a close the long-drawn-out campaign to capture Richmond, the Confederate capital.

In November 1864, although their support had wavered during months of defeat, the people rallied behind Lincoln and elected him for a second term. He prepared to serve for another four years.

In March 1865, as he gave his inaugural address, the end of the

GETTYSBURG ADDRESS

FOUR SCORE AND SEVEN YEARS AGO OUR FATHERS BROUGHT-FORTH ON THIS CONTINENT A NEW NATION CONCEIVED IN LIBERTY AND DEDICATED TO THE PROPOSITION THAT ALL MEN ARE CREATED EQUAL.

NOW WE ARE ENGAGED IN A GREAT CIVIL WAR TESTING WHETHER THAT NATION OR ANY NATION SO CONCEIVED AND SO DEDICATED CAN LONG ENDURE. WE ARE MET ON A GREAT BATTLEFIELD OF THAT WAR. WE HAVE COME TO DEDICATE A PORTION OF THAT FIELD AS A FINAL RESTING PLACE FOR THOSE WHO HERE GAVE THEIR LIVES THAT THAT NATION MIGHT LIVE. IT IS ALTOGETHER FITTING AND PROPER THAT WE SHOULD DO THIS. BUT IN A LARGER SENSE WE CAN NOT DEDICATE-WE CAN NOT CONSECRATE-WE CAN NOT HALLOW-THIS GROUND. THE BRAVE MEN LIVING AND DEAD WHO STRUGGLED HERE HAVE CONSECRATED IT FAR ABOVE OUR POOR POWER TO ADD OR DETRACT. THE WORLD WILL LITTLE NOTE NOR LONG REMEMBER WHAT WE SAY HERE BUT IT CAN NEVER FORGET WHAT THEY DID HERE. IT IS FOR US THE LIVING RATHER TO BE DEDICATED HERE TO THE UNFINISHED WORK WHICH THEY WHO FOUGHT HERE HAVE THUS FAR SO NOBLY ADVANCED. IT IS RATHER FOR US TO BE HERE DEDICATED TO THE GREAT TASK REMAINING BEFORE US-THAT FROM THESE HONORED DEAD WE TAKE INCREASED DEVOTION TO THAT CAUSE FOR WHICH THEY GAVE THE LAST FULL MEASURE OF DEVOTION-THAT WE HERE HIGHLY RESOLVE THAT THESE DEAD SHALL NOT HAVE DIED IN VAIN-THAT THIS NATION UNDER GOD SHALL HAVE A NEW BIRTH OF FREEDOM-AND THAT GOVERNMENT OF THE PEOPLE BY THE PEOPLE FOR THE PEOPLE SHALL NOT PERISH FROM THE EARTH.

The Gettysburg Address is carved into the stone of the Lincoln Memorial in Washington, D. C. Lincoln delivered this address at the dedication of the national cemetery on the Gettysburg battlefield, Nov. 19, 1863. He later wrote out several copies of the speech with slight variations. This was his final version of the speech.

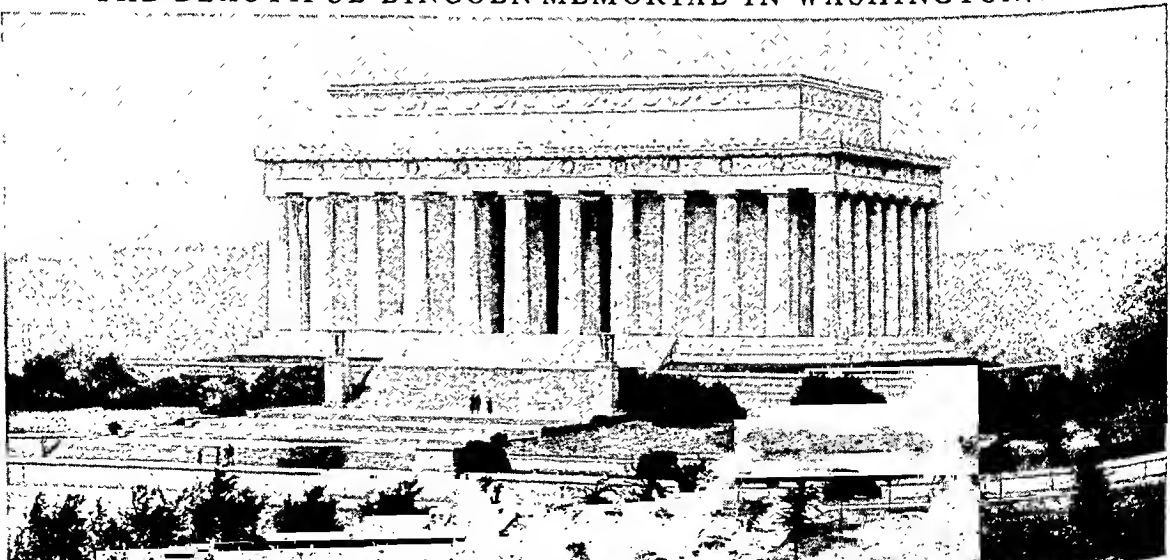
war was in sight. He looked forward to welcoming the Southern states back into the Union, and making their readjustment as easy as possible. He expressed that thought in these words:

With malice toward none, with charity for all, with firmness in the right as God gives us to see the right, let us strive to finish the work we are in; to bind up the nation's wounds, to care for him who shall have borne the battle and for his widow and his orphan, to do all which may achieve and cherish a just and lasting peace among ourselves and with all nations.

The agony he endured and the terrific strain of the war had so exhausted Lincoln that he felt he would not live long after it was over. His end came, but not as he had foreseen. On April 9 came the word that General Lee had surrendered to Grant at Appomattox Court House in Virginia. On April 14 the Stars and Stripes were raised again over Fort Sumter, where the war had begun. That night Lincoln was shot.

He sat at Ford's Theater with Mrs. Lincoln and two guests, enjoying a comedy, when the murderer, John Wilkes Booth, a young actor, entered the box, fired the shot, swung himself onto the stage, and then, flourishing a dagger, rushed from the scene. Lincoln was carried to a small house across the street

THE BEAUTIFUL LINCOLN MEMORIAL IN WASHINGTON, D. C.



The Lincoln Memorial stands in West Potomac Park at the west end of the Mall. The cornerstone was laid in 1915 and formal dedication services opened the building in 1922. Henry Bacon served as architect and Jules Guerin as mural decorator. The plan was based on a modified Greek temple form, with Doric columns outside and Ionic columns inside. The building is constructed of white Colorado marble, pink Tennessee marble, and Indiana limestone. A skylight lights the interior.

from the theater. There he died early the next morning, April 15, 1865.

His coffin stood in the East Room of the White House as he had seen it in a dream. Then a funeral train draped in mourning bore it across the country, home to Springfield, Ill. At every station it was met by crowds overwhelmed with sorrow.

Only after he was gone, did people begin to realize his greatness. Each year thousands of people visit the Lincoln Memorial in Washington, D. C. As they gaze up at the great seated figure of the kindly, brave man, the visitors are living proof of the words that are inscribed on the marble above it:

In this temple, as in the hearts of the people for whom he saved the Union, the memory of Abraham Lincoln is enshrined forever.

Books about Lincoln

Books for younger readers: 'Abraham Lincoln', by I.M. and E.P. d'Aulaire (Doubleday, 1939); 'Abraham Lincoln', by James Daugherty (Viking, 1943); 'Abraham Lincoln', by Genevieve Foster (Scribner, 1950); 'Abraham Lincoln', by C. I. Judson (Wilcox & Follett, 1950). Books for older readers: 'Lincoln Reader', by P.M. Angle (Rutgers University Press, 1947); 'Life and Writings', by Abraham Lincoln (Modern Library, 1942); 'Abe Lincoln and His Times', by the editors of *Look Magazine* and E.L. Meadowcroft (Crowell, 1946); 'Abe Lincoln Grows Up' (Harcourt, 1928) and 'Abraham Lincoln: The Prairie Years', by Carl Sandburg. Abridged ed. (Harcourt, 1929); and 'Abraham Lincoln', by B. P. Thomas (Knopf, 1952).

LINCOLN, NEB. Government offices, two universities and a college, and a thriving trade with the people of a wide farming area are important factors in Lincoln's prosperity. Lincoln is the capital of Nebraska. Besides housing the state's offices and institutions, the city is a regional headquarters for the national government's Veterans Administration and the Department of Agriculture and has a large veterans' hospital. Lincoln is the seat for the University of Nebraska, Nebraska Wesleyan University (Methodist), and Union College (Seventh Day Adventist). Farmers of the fertile surrounding land sell their grain to elevator operators and buy staples and luxuries from stores in Lincoln.

The capital is located in southeast Nebraska, about 48 miles southwest of Omaha. It occupies a shallow basin about 1,160 feet above sea level. Salt Creek and its tributaries thread through the basin. The State Capitol, completed in 1932, is near the city's center. It is topped by a 400-foot tower.

above which rises a statue called 'The Sower', symbolizing Nebraska's agriculture. The capitol houses the museum of the state historical society; and Morrill Hall, at the university, contains the state's natural history museum. Pioneer Park (600 acres) is the city's biggest recreational area. The Nebraska State Fair, held in September, attracts great throngs.

Lincoln has large rail repair shops. Among its industries are factories making telephone equipment, watches, gasoline motors, and wood and metal products. Several well-known insurance companies also make their headquarters in this city.

A small settlement was established in 1856 to work the salt deposits found here. In 1859 the settlement was made the seat of Lancaster County and named Lancaster. In 1867 Nebraska entered the Union, and the town, renamed Lincoln for the Civil War president, was made the state capital. William Jennings Bryan, for 30 years a power in American politics, was long a resident of Lincoln (see Bryan).

The city government is a modified form of the manager plan. An elected mayor and six councilmen serve part-time and employ three full-time administrative heads. The water and electric supply systems are municipally owned. (See also Nebraska.) Population (1950 census), 98,884.

LINCOLN-DOUGLAS DEBATES. On July 24, 1858, Abraham Lincoln challenged Senator Stephen A. Douglas to a series of seven debates during the campaign for election to the Illinois legislature. This legislature was to elect a United States senator. Douglas, a Democrat, was seeking senatorial reelection. Lincoln opposed him, and in accepting the Republican nomination had delivered his "house-divided-against-itself" speech.

Although the immediate prize was the senatorship, the contest was fought on a national stage. Douglas, as chairman of the senatorial committee on territories, was responsible for the Kansas-Nebraska Act. He was one of the half-dozen leaders of the Democratic party and one of the great public figures and orators of the day. Lincoln was about to prove himself the great "convincer." It is certain that both men knew the importance of the parts they played. In his speech at Quincy, Lincoln described the debates as "the successive acts of a drama . . . to be enacted not

FRENCH'S 'SEATED LINCOLN'



This magnificent statue of Abraham Lincoln is the work of Daniel Chester French. It stands in the main chamber of the Lincoln Memorial, shown on the opposite page.

merely in the face of audiences like this, but in the face of the nation . . .”

Both Lincoln and Douglas were skilled campaigners. Douglas had certain material advantages. As attorney for an Illinois railroad, he often rode a special train. Lincoln traveled as best he could and once was in a freight caboose that was switched to a siding to let Douglas’ special pass. Douglas was portly, suave, and had an air about him of success and fine living. Lincoln—tall, gaunt, and homely—retained his small-town lawyer manner on the debate platform. But in clearness, force, and moral earnestness, Lincoln was more than a match for Douglas.

The first meeting was held at Ottawa, Aug. 21, 1858, and the last of the seven at Alton, October 15. The others were at Freeport, Jonesboro, Charleston, Galesburg, and Quincy. At the second meeting, at Freeport, Lincoln forced an answer from Douglas that perhaps changed the course of American history.

Disregarding the advice of his friends, Lincoln asked Douglas if the people of a territory could exclude slavery. According to Douglas’ own doctrine of popular sovereignty, the answer should be “yes,” but according to the Dred Scott Decision, which de-

clared that Congress had no power to exclude slavery from a territory, the answer should be “no.” If Douglas answered “yes,” he would displease the South; if he answered “no,” he would lose support in the North. Douglas answered as Lincoln expected—that no matter what the court might do, “slavery cannot exist a day or an hour anywhere unless it is supported by local police regulations,” and that a territory could by “unfriendly legislation” keep out slavery.

The immediate result of the debates was a disappointment to Lincoln. In a typical homely comparison, he declared that he was “like the boy who stubbed his toe. It hurt too bad to laugh, and he was too big to cry.” The Illinois legislature re-elected Douglas. But Douglas’ “Freeport Doctrine” was the direct cause of the break in the Democratic party in 1860, when the Southern Democrats rejected Douglas as their candidate for the presidency. In spite of defeat, Lincoln became more widely and favorably known. Prominent men began to speak of him as a candidate for the Republican presidential nomination two years later. (See also Douglas; Dred Scott Decision; Kansas-Nebraska Act; Lincoln.)

AMERICA’S “LONE EAGLE of the SKY”

LINDBERGH, CHARLES AUGUSTUS (born 1902). On May 20-21, 1927, Charles Lindbergh flew a small, silvery monoplane, *The Spirit of St. Louis*, nonstop from New York to Paris. It was the first solo transatlantic flight, and the daring, skill, and endurance Lindbergh displayed earned him world acclaim.

Thereafter, Lindbergh’s refusal to commercialize upon his popularity further endeared him to the public. Since his memorable epic flight, Lindbergh has devoted himself to the causes of aviation, science, and patriotism.

Charles Lindbergh was born Feb. 4, 1902, at his grandfather’s home in Detroit, Mich. His father, also named Charles Augustus, had been brought to a Minnesota farm from Sweden while still an infant. The father married Evangeline Lodge Land, a teacher. In 1906 the father was elected to Congress, and for a time won national attention for his debates in the House of Representatives. The boy’s time was divided between Washington and the family’s Minnesota farm, near Little Falls. The boy and his father fished and hunted together. He became interested in machinery and knew every part of his bicycle and—

as he grew older—of his motorcycle and car. There was also a close association between mother and son.

Lindbergh Learns to Fly

Lindbergh graduated from the Little Falls high school in 1918 and entered the University of Wisconsin. He studied mechanical engineering but, after three

YOUNG CHARLES AND HIS MOTHER



This is Lindbergh when he was eight years old, photographed with his mother. Already he showed a mechanical bent, and his mother, who had been a teacher, encouraged him to think for himself.

semesters, left college to enter an aviation school at Lincoln, Neb. At this school he studied the mechanics and theory of flight and learned to make parachute jumps and to walk on the wing of a flying biplane. He made his first solo flight at Americus, Ga., in April 1923. For a time he earned his living by “barnstorming”—taking passengers for short hops and performing daring exhibitions.

In March 1924 he became a flying cadet in the United States Army, and trained at Brooks

and Kelly fields, near San Antonio, Tex. He graduated with a pursuit pilot’s rating and the rank of second lieutenant in the Army Air Corps Reserve.

He was hired as a test pilot by a St. Louis firm. This firm won a contract to fly mail between St. Louis and Chicago. Charles Lindbergh was selected to make the first flight over the route on April 15,

1926. Within a year, he flew more than 50,000 miles over this mail route. Twice he had to make parachute jumps to save his life.

Seasoned by more than 1,500 hours of flying, Lindbergh decided to try for the Raymond Orteig prize of \$25,000, offered since 1919 for the first nonstop flight between New York and Paris. St. Louis businessmen agreed to help pay the cost of building a plane. Early in 1927, he went to San Diego to superintend the building of a Ryan monoplane, which he named the *Spirit of St. Louis*. (For picture and description, see *Airplane*.)

Lindbergh put his new plane through severe tests. On May 10, 1927, he flew it from San Diego to St. Louis; and on May 12, he leaped to New York, setting a new coast-to-coast record. He entered his name in the contest for the Orteig prize. Only a few days before, on May 8, the famous French aces Nungesser and Coli had perished in their attempt to fly from Paris to New York. When news spread that Lindbergh would try to fly the Atlantic alone, people shuddered. Few knew how carefully he had prepared.

Off for Paris

Early in the morning of May 20 Lindbergh climbed into the *Spirit of St. Louis* at Roosevelt Field on Long Island. Down the runway the plane lurched and bounded. Heavily loaded with gasoline, it clung to the earth, bounced, dropped, and then lifted slowly. At 7:52 A.M., "We" were off, vanishing in a drizzle. Just before nightfall, Lindbergh passed over St. John's, Newfoundland, on the way to the open sea. Through fog, rain, and sleet, the plane throbbed on, true to the course. At 10 P.M., Paris time, May 21, a crowd at Le Bourget Field heard the faint drone of a motor. Louder and louder it grew until the searchlights played upon a silver bird. At 10:21 P.M., it alighted, having flown 3,600 miles in 33 hours and 29 minutes.

From the cabin of the plane, Lindbergh emerged a world hero. At 25 he had performed a greater feat than any other pilot in the history of aviation. He was decorated by the president of France, the king of the Belgians, and the king of England. President

Coolidge presented him with the Distinguished Flying Cross and made him a colonel in the Officers' Reserve Corps. Medals and gifts poured in on him from all parts of the world.

A Career Devoted to Promoting Aviation

Lindbergh soon indicated that he would give his life largely to the task of inspiring confidence in the airplane as a practical means of world-wide transportation.

He refused commercial offers that would have made a fortune for him. Sponsored by the Daniel Guggenheim Foundation for the Promotion of Aeronautics, he flew the *Spirit of St. Louis* to cities in every state of the Union. He then made a good-will swing over Mexico, Central America, and the West Indies, which ended Feb. 13, 1928, before giving his plane to the Smithsonian Institution. He was made air counsel to the Department of Commerce and adviser to commercial aviation companies.

In 1929 he married Anne Morrow, daughter of Dwight W. Morrow, then ambassador to Mexico. She accompanied him on later expeditions. In 1931 they blazed a northern air route from New York to China and in 1933 they circled the North Atlantic coast to study air lanes and bases

for commercial transatlantic flying. In 1937 they surveyed an air route from England to India.

Lindbergh's Contributions to Science

Lindbergh also made contributions to archeology and medical research. In 1929, flying over Yucatan, he photographed unknown ruins of Mayan civilization. Working with Dr. Alexis Carrel of the Rockefeller Institute for Medical Research, he developed a method for separating red corpuscles from blood serum. With Carrel in 1935 he perfected an "artificial heart and lungs"—a device in which parts of the body could be kept alive with a supply of blood and air.

Along with fame, bitter tragedy came to the Lindberghs. Their first child, Charles Augustus, Jr., who was born in 1930, was kidnaped and killed in 1932. In 1935 the Lindberghs established themselves in Europe. Returning to the United States in 1939 Lindbergh publicly opposed American intervention in the

THE FLYER WITH HIS FAMOUS PLANE



This photograph of Lindbergh beside *The Spirit of St. Louis* was made just before he took off on his historic flight to Paris.

second World War. After Pearl Harbor he was active as a civilian adviser to the Army and Navy air forces. Often at the fronts he helped make improvements in combat tactics and planes. He continued this work after the war and made new studies of air routes. In 1948 he wrote 'Of Flight and Life'. In 1949 he was awarded the Wright medal for contributions to aeronautics. He won the 1954 Pulitzer prize for his autobiographical 'The Spirit of St. Louis'.

Mrs. Lindbergh's books include 'North to the Orient', 'Listen! the Wind', describing the 1931 and 1933 flights; and 'The Wave of the Future' (1940).

LINDEN. The American linden, more properly called the basswood, is the largest of the 18 species of linden native to North America. Local names applied to the various species are linn, white basswood, bee tree, lime tree, and whitewood. The basswood thrives in woods and river bottoms from Canada south to Georgia and westward. In summer its flowers with their unusually penetrating fragrance attract great swarms of bees. Honey from the nectar thus obtained has a distinctive flavor and is delicious. The tree may live for several hundred years and some specimens are more than 100 feet high. (For pictures, see Trees.)

The southern basswood, a much smaller tree, is found from Indiana to Florida. It is distinguished by its leaves, which have a hairy, silvery-white undersurface. The European linden, often called the lime, is grown as a shade tree in Europe. Berlin's famous street *Unter den Linden* was named for its lindens.

Basswood is light and white and is used chiefly for food containers, such as honey boxes and headings for flour barrels. It is also used for veneer, furniture, musical instruments, and excelsior. The fibrous inner bark (bast) is used in mats, chair seats, and baskets.

Scientific name of basswood, *Tilia glabra*; of southern basswood, *Tilia heterophylla*. Bark of mature tree has vertical ridges, separating into thin scales. Leaves 4 to 7 inches long, heart-shaped. Flowers yellowish white, in drooping clusters on stalks suspended from leafy bract. Fruit, greenish gray, downy, and nutlike; remains attached to bract.

LINEN. "Purple and fine linen" was the clothing of princes in Biblical days, and fine linen is still a luxury. Lustrous table damask of linen rivals silk brocade in beauty. Snowy-white bleached linen, with its fine smooth surface, is the preferred material for handkerchiefs and embroidery fabrics. Since linen is an excellent conductor of heat, linen clothing is cool for summer. Linen towels are preferable to cotton, for they absorb moisture more readily. Its great tensile strength makes linen desirable for sailcloth and the most delicate handmade laces. Heirlooms of lace and table linen, as well as Egyptian mummy cloths, attest the durability of linen.

Linen does not dye so well as silk, cotton, or wool and unless specially treated is more likely to fade. Linen fabrics are traditionally given to wrinkling and creasing. Modern finishes, however, have been devised to make linen "crush resistant," increasing its popularity for women's clothing (see Fabrics).

The processes by which linen is made from the flax fiber are described in the article on Flax. Combing flax preparatory to spinning produces two types of fibers, "line" and "tow." Line fibers are the long fine ones and tow the short coarse ones. Line flax makes the smoothest and most durable fabrics. Tow flax is not so strong, and threads spun from it are coarse and uneven. It is used in crash tablecloths and towels. The finest linen threads, for handmade laces, are still spun by hand.

To judge the quality of linen, observe the firmness of the cloth and the evenness of the weave. You can do this best by holding the cloth against a strong light. Threads packed closely into the cloth indicate good quality. Look also for labels which tell whether the fabric is all or only part linen.

The linsey-woolsey which American pioneer women used for making garments was a coarse, strong fabric woven of linen and wool.

The valley of the Nile was the original home of flax and linen. Some of the chief centers of linen manufacture today are Belfast (Ireland), Dundee and Dunfermline (Scotland), Leeds (England), and certain towns in northern France, Belgium, and Germany.

LINNÉ, CARL VON (1707-1778). The Swedish naturalist and physician Linné brought into general use the system of naming plants and animals which is now universally employed. This is the *binomial* (two-name) system, in which each plant and each animal is assigned a name consisting of two Latin words. The first word is the name of the *genus*, and the second is the name of the *species*. (See Biology.) So important was Linné's work of classification, especially in botany, that he is called the "Father of Systematic Botany."

Linné, who is more often known as Linnaeus (the Latin form of his name, under which he wrote) was born at Rashult, Sweden. His father was a pastor and hoped that the boy would follow the same calling. But Carl was more interested in plants and animals than in reading, and did so poorly at school that his father proposed to apprentice him to a shoemaker. The village physician saw, however, that the boy had unusual gifts and encouraged the father to help him while he studied medicine at the University of Uppsala. Here his talents soon won him an appointment as assistant in botany. Later the Academy of Sciences of Uppsala sent him on a 5,000-mile botanical survey of Lapland. He supported himself by lecturing and tutoring, but was too poor to take his degree. Aid came from his future wife, who helped provide the funds with which he obtained his doctor's degree in medicine at a university in Holland.

In Holland Linné got the position of medical attendant to an Amsterdam banker, who had a large botanic garden. Linné was made director of this, and in the next few years published his 'Systema naturae' and 'Genera plantarum', into later editions of which he introduced his famous system of classification.

After scientific journeys to France and England Linné returned to Stockholm to practise medicine.

In 1742 he was appointed to the chair of botany at Uppsala. There he spent the rest of his active life. Students came to him from all quarters of the civilized world and searched the earth for specimens to contribute to his studies.

Linne's system of classification was an artificial one. In botany it was based mainly on the number of stamens and pistils in the flower. He himself regarded it as only a temporary convenience to be supplanted by a natural system whenever the fundamental relationships of the plants should become known. In the 19th century the theory of evolution supplied some of the principles needed for a natural system, but the broad outlines of the Linnean system were retained.

LINOLEUM. Since the 1860's, when linoleum was developed in England, it has come into world-wide use. Today it covers thousands of square miles of floors in homes, offices, stores, and institutions. Although it was originally developed as a floor covering, linoleum has been found suitable for many other uses, including coverings for walls, tables, desks, work benches, and shelves.

The raw materials for linoleum come from widely separated sections of the globe. Jute, of which burlap is woven, comes from India and Indonesia. Portugal, Spain, France, and North Africa grow the cork oak tree. Flax, from which linseed oil is made, is grown in many countries. Resins are obtained from pine trees in the southern part of the United States. Other raw materials that go into the making of linoleum include wood, gums, chalk, and pigments.

How Linoleum Is Made

Linseed oil readily *oxidizes* (combines with oxygen) when exposed to air. The oxidized oil thickens to a rubberlike consistency. Cork and wood are ground to fine dusts; the dusts are called *flours*.

A *cement* is made of the oxidized oil, resins, and gums. These are cooked in a great kettle until they blend and thicken. The cork and wood flours, pigments, and other materials are worked into the cement; the result is called a *linoleum mixture*.

The linoleum mixture is fed to a *scratcher* machine. This has two rolls, one cold and the other hot. The hot roll softens the mixture, which then clings to the cold roll. Spikes on a rapidly revolving cylinder scratch small particles, or grains, of the mixture from the cold roll.

These grains enter a *calendering* machine. Burlap passes between the machine's two large, heated rolls. Under their pressures the grains fuse, and the fused material is squeezed into and smoothed on the burlap.

Although linoleum emerging from the calendering machine looks like the linoleum in use, it is still soft. It is *cured* (hardened) in tall, narrow stoves. The great loops of linoleum remain in the stove from a few days to a few weeks, depending upon the thickness and the quality of the linoleum.

Plain linoleums vary from a little more than one sixteenth to almost one quarter of an inch in thickness. *Battleship linoleum* (so called because it first was made for naval ships) is the thickest linoleum.

Printed linoleum is thin, plain linoleum on which an oil-paint design has been printed. The print is made before the linoleum is wholly cured, and after printing it is returned to the stove.

The colors of *inlaid linoleum* extend from the surface to the burlap backing. The linoleum for inlay is prepared without backing in variously sized blocks and strips. These are partly cured. The variously colored blocks then are fitted into a pattern or design on backing. For intricate designs, pieces are cut in desired shapes from strips. Inlaid linoleum is then passed through heated rolls so as to squeeze it into the backing and to fuse the pieces into one. The patterns of *molded inlaid linoleum* are made by sifting variously colored grain mixtures through stencils onto burlap backing. A stencil is needed for each color used. *Embossed linoleum* gives an appearance of fitted tiles. The slightly varying heights of the design are formed by the dies of a molding press. These linoleums also must be further cured.

Other Linoleumlike Coverings

Manufacturers give trade names to the many linoleums and linoleumlike coverings they make. Some pieces that are to be fitted in place on walls or floors, for instance, are called *linotile* and *rubber*, asphalt, and cork tiles. Tiles do not have a burlap backing.

Printed linoleums are the least expensive of the linoleum coverings. They usually have a felt rather than a burlap backing. Vinyl, a product of petroleum, now is sometimes used in place of linseed oil. Today, almost all linoleums are made of mixtures of cork and wood flours. The quantities of each used depend upon the particular kind of linoleum wanted.

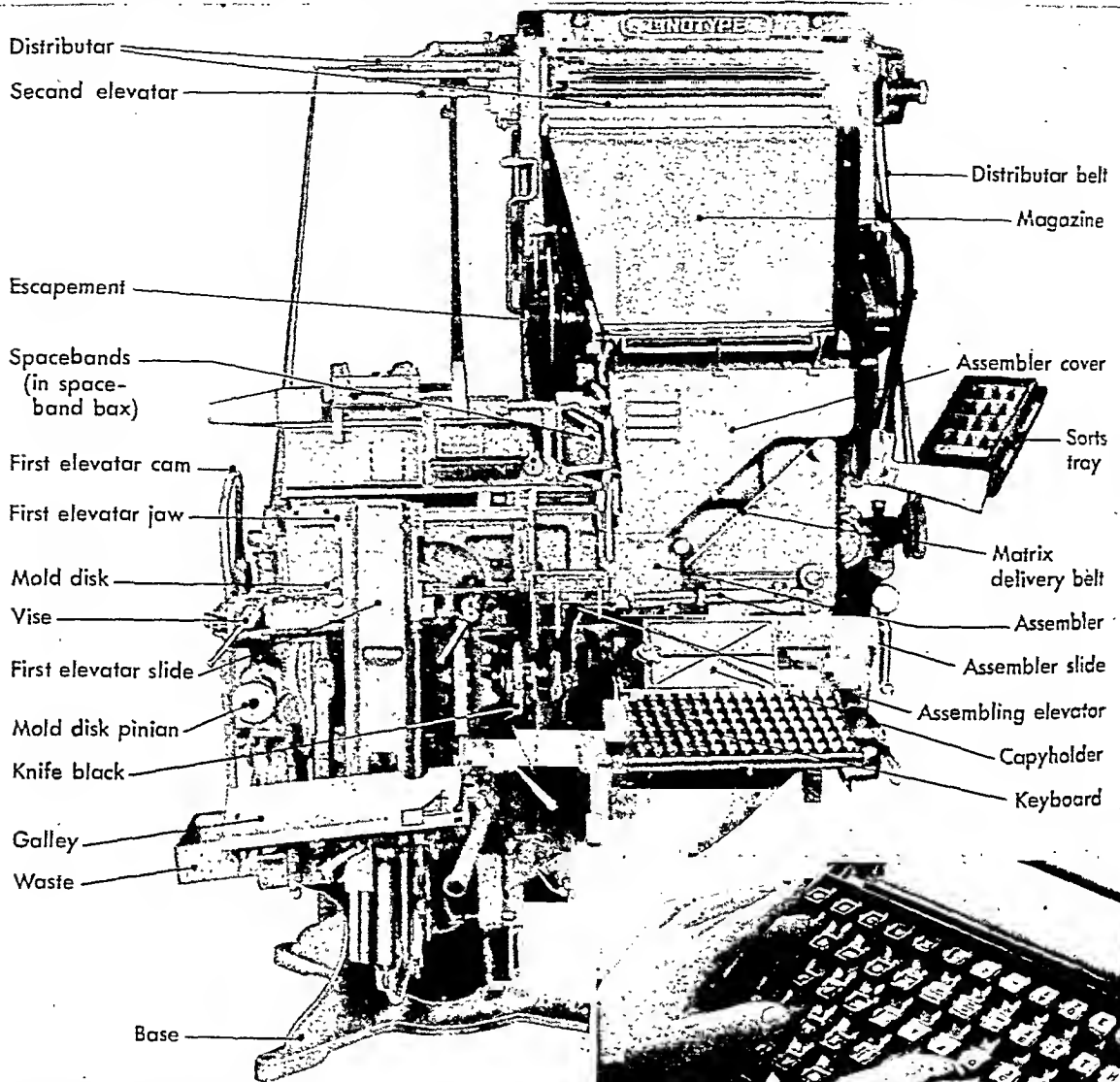
How Linoleum Developed

Linoleum is the end result in the evolution of manufactured floor coverings which began with oilcloth and which was in use as early as the 1600's. Practically all the development of linoleum was made in England. In 1636 the English government granted a patent for a process of applying oil paint to woolen cloth. In the 1750's a floor covering made by mixing India rubber with oils and resins and applying the mixture to a cloth backing was produced.

Soon after this Nathan Smith made a floor covering by pressing a mixture of resin, Spanish brown, beeswax, and liquid linseed oil to a canvas backing. In 1844 Elijah Galloway made a floor covering by heating India rubber to a plastic softness and then mixing in cork flour.

Linoleum was developed and named by Frederick Walton, of Yorkshire. The Latin for "flax" and "oil" is *linum* and *oleum*. Walton combined these into "linoleum" as a name for his floor covering, made principally out of linseed oil. The raw materials for the first linoleum were oxidized linseed oil, resins, cork flour, and burlap. Walton's crude process has been improved, and modern manufacturers have added some materials and substituted others, but modern processes of linoleum making are essentially the same as Walton's.

Molding LINES of TYPE by MACHINE



On this modern Linotype machine, an operator can set about 10,000 characters an hour. This amounts to more than three full columns in this book. He works by lightly touching the keys on the keyboard, shown in larger view at the right. The machine responds through an intricate series of operations and produces one-piece lines of type of the desired width.

LINOTYPE. In the middle of the 1400's, Johannes Gutenberg developed a practical method of casting separate printing types in metal. For hundreds of years thereafter, printers used separate types to form words and lines and combined them in columns and pages. Skilled craftsmen, called *compositors*, set the type by hand. They stood at *cases* containing thousands of type characters sorted into more than a hundred small compartments. Before a book, magazine, or newspaper could be printed, compositors had to pick up and arrange into lines of even length perhaps more than a million pieces of type. A skilled compositor could set about 3,000 characters an hour—or about a column of the type in this book.



All the pieces were valuable; and after each use they were carefully distributed into their proper compartments. The distribution was slow and tedious work. Moreover, each use wore the faces of the types; and since some pieces were used more often than others, unequal wear appeared and the whole assortment, or *font*, became worthless.

Newspapers, particularly the large dailies, needed large staffs of compositors to get speedy composition. News stories were broken up into small "takes" and divided among several typesetters. The portion each man set was then assembled in proper order—again a

slow and expensive process. Inventors tried many devices to satisfy the demand for speed and economy. Some of them hit on the idea of setting type by machines that would "compose" or bring type together by touching a keyboard. These devices were cumbersome and usually required two or three men to operate them. They remained only curiosities.

Line-Casting Machines Solve the Problem

Finally in 1884, after long experimenting, Ottmar Mergenthaler, a naturalized American, patented the Linotype. In 1886 Mergenthaler's first successful machine was put into use by the *New York Tribune*.

The Linotype was a revolutionary invention—one of the mechanical marvels of the age. As the name implies, the line of type is cast on a solid metal bar, called a *slug*. It contrasts with a method of individual type casting developed about the same time (see *Monotype*). With many improvements contributed by numerous inventors, slug-casting, or line-casting, machines are used today to set nearly all the world's newspapers and magazines and most of the world's books. Two other line-casting machines in successful use are the Intertype and the Ludlow.

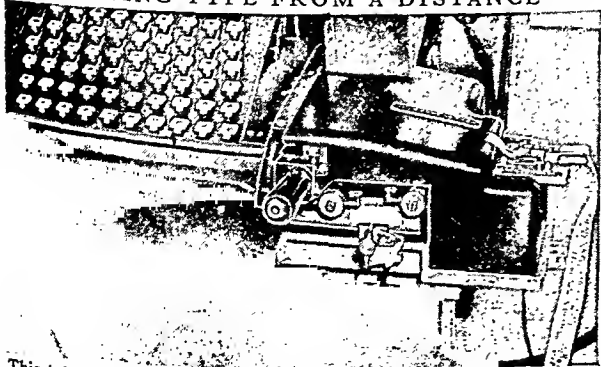
A good Linotype or Intertype operator can set 10,000 characters an hour—as much as three hand compositors. In skilled hands the quality of work done compares favorably with hand setting. Another advantage is the elimination of type distribution. The slugs are reclaimed by being thrown into a melting pot to be used over and over.

How Line-Casting Machines Work

A modern Linotype machine is shown at the head of this article; and a modern Intertype is shown in the top picture on this page. The basic operations of both machines are similar and can be summed up as three general steps: (1) composing, or assembling the brass type molds, called *matrices* (a single mold is called a *matrix*); (2) casting the line, or slug, from the matrices; (3) distributing the matrices to their original positions. (All the working parts described can be seen in pictures throughout this article.)

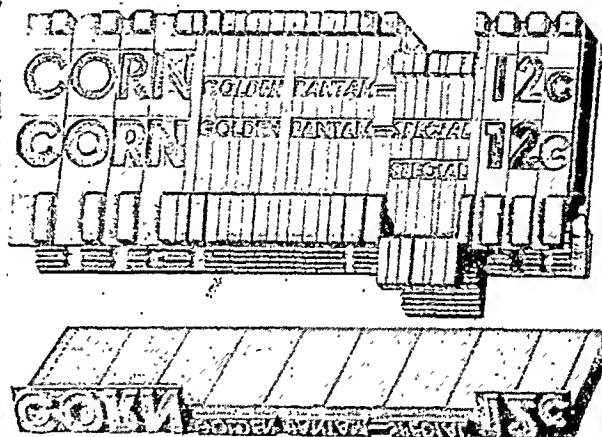
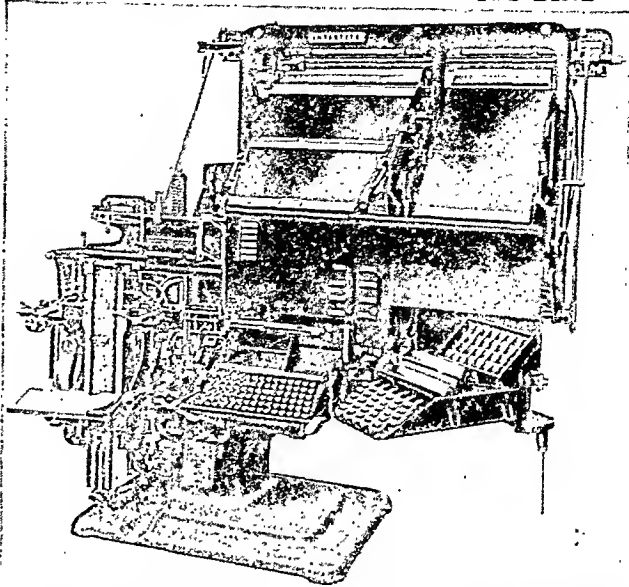
The matrices are held in a large container called a *magazine*. Each magazine has nearly a hundred slots,

SETTING TYPE FROM A DISTANCE



This teletypesetter is attached to the keyboard of a line-casting machine. The punched tape at the right is operating the machine automatically. The tape itself is a duplicate of an original tape punched by an operator in a distant city and reproduced for this machine by telegraph signals. Thus one operator can work machines in several widely separated places.

THE INTERTYPE MACHINE AND ITS LINE

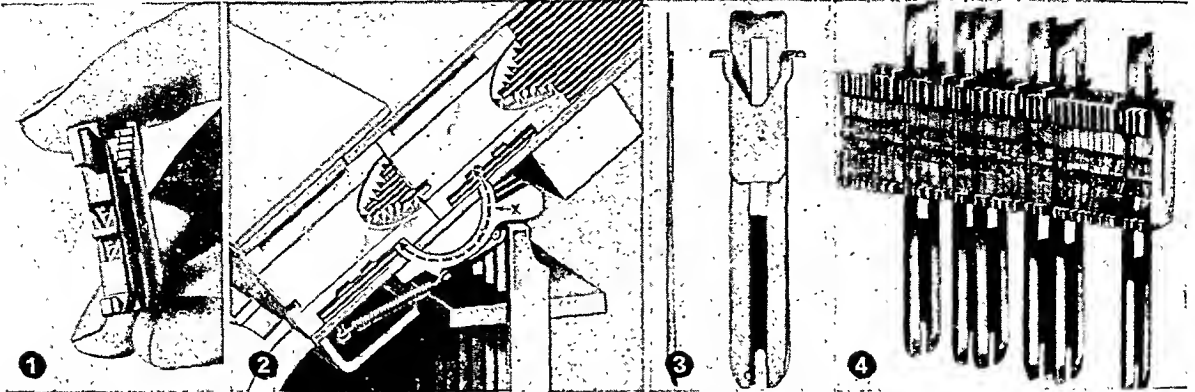


At the top is a four-magazine Intertype machine, with four auxiliary magazines. These give the operator a choice of 12 to 16 type faces. Below the machine is an assembled line of Intertype matrices. Each matrix has molds for roman and italic type. Either kind of mold can be presented to the casting mechanism. At the bottom is a line (or slug) cast from the matrices.

or channels, one for each letter or other character. The channel contains several matrices of its particular character. When the operator presses a key, an escapement device releases the lowest matrix in the channel and moves the next one down to the low position, ready to be released at the next touch of the key. The matrix drops to a *matrix delivery belt*, which carries it to an *assembler*. At each space between words, the operator releases a special *spaceband*, or *space bar*. The distances the matrices must travel and the running speed of the belt are exactly calculated. Thus although there are nearly a hundred characters coming from different distances, they all take the same time to reach the assembler, and so they arrive in proper order.

When a full line of matrices and spacebands has been assembled (or composed), the operator presses a lever which raises the composed line in an assembly elevator. This clears the way for setting another line while the first is being cast.

HOW THE MATRICES AND SPACE BARS FORM THE LINE



1. This matrix can mold either a roman (vertical) or italic (slant) capital A. The grooved V-shaped indentation at the top is used to return the matrix to the magazine. 2. Here matrices are held in a magazine channel. When the operator touches the right key, the U-shaped escapement mechanism (X) rocks as shown to release the lower matrix and returns to position when the next matrix slides into the lower position. 3. Here are side and front views of a spaceband. The long wedge-shaped part slides into the small matrix-shaped part to help fill out the line. 4. Matrices and space bars are assembled in line, ready for casting.

The line is now composed and ready for casting, except for one important detail—the automatic spacing, or *justifying*, of the line to its full width. A line of type must be set to an exact width, or *measure*; otherwise the right-hand edge of a column or page of type would appear ragged and uneven. The letter characters make up words of varying widths; and the spacebands between the words must take up all the leftover space. The adjustable spaceband is made in two parts. The smaller part looks like a matrix without a character mold. The larger part is wedge-shaped and can slide up and down the smaller part along tracks, or *gibs*. When the thicker part of the wedge is forced up between the matrices, it helps fill out the line to its proper width.

Casting the Line

The assembly elevator carries the assembled line of matrices and space bars to the casting position. Here the line is held against a slot in the *molding disk*, with the matrix molds exposed to the slot. Molten type metal rises from a pot through a *spout*

and fills the matrix molds to form the line. As the slug of hot metal solidifies, the molding disk revolves part way and forces the slug against knives that trim it to desired size. The slug then emerges to take its place in the galley with the lines previously cast.

The picture at the bottom of the page shows a four-position molding disk and its pot of molten metal. Molding disks are cooled by circulating water and may have as many as six molding slots. Each slot makes a slug of different width and thickness. The type metal is kept molten by gas or electric heat; and new metal is fed either automatically or by hand into the pot to keep it full.

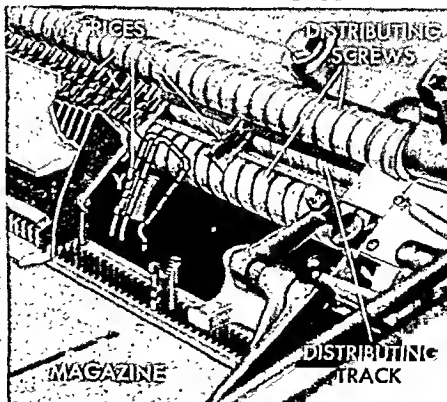
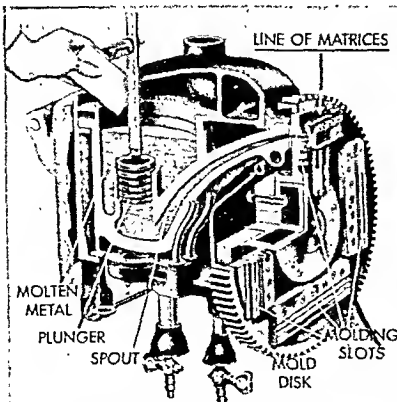
Distributing the Matrices

As soon as the line is cast, the matrices and space bars are returned to their original position to be used again. This *distributing* process begins when a long *elevator arm* swings downward and picks up all the matrices, but leaves the space bars. These bars are pushed directly into their storage spaces. Meantime

the arm carries the matrices up to the side of the magazine; and here the matrices are pushed on to a *distributor track*. *Distributor screws*, winding parallel to the track, push the matrices along until each matrix comes directly over its proper storage channel in the magazine. There it drops off automatically.

This automatic drop takes place because of the construction of the track and of the matrix itself. The track has many grooves along its length. The V-shaped notch on each matrix has a special set of projecting teeth. These teeth hook into cer-

CASTING AND DISTRIBUTING MECHANISMS



At left is a cutaway view of the molding disk with its pot of molten metal. A line of matrices is held against one of the molding slots. The plunger in the pot forces molten metal up the spout and into the faces of matrices to mold a line. The operator is dropping a piece of type metal into the pot to renew the supply. The cutaway picture at the right shows how matrices are returned. Distributor screws push each matrix along the grooved track until it reaches its channel. There the track grooves are cut away and the matrix drops off, as shown at X. A more exposed view is shown at Y, with the channel indicated by white lines.

tain grooves along the distributing track and so support the matrix as the screws push it along. But at the place in the track directly over the channel where a matrix belongs, the particular combination of grooves supporting the matrix is cut away. Thus when the matrix reaches its channel, it falls off into the magazine.

Matrices and Slugs

A picture on a previous page shows a line of Intertype display matrices and the cast slug as it appears after trimming. The side ribs prevent one slug from sticking to the next. The letters on the matrices are cut into them and read like print. On the slug, however, the letters are raised and read backward, in order to make them read from left to right when printed. By using different fonts of matrices and different sizes of molding slots, slugs can be cast with a body size of 5 points to 60 points (in printer's measure, a point is $1/72$ of an inch). The slugs can be up to 5 inches (in some machines, 7 inches) long, with letters 5 to 60 points high.

The word "linotype" has come to mean line-casting machines in general. The Intertype, a later development, does practically the same work, and in fact, is virtually interchangeable with the Linotype. By an improved method of shifting from one magazine to another while in operation, the Intertype quickly casts a slug having several different type faces. Here is an extreme example of the Intertype's ability to combine different faces in one slug:

COMPTON's PICTURED ENCYCLOPEDIA

This line has *nine* kinds of type. From left to right they are: boldface capitals (first letter of first two words), boldface small capitals, boldface italics, boldface lower case, boldface italic capitals, roman lightface capital (E), roman lightface lower case, lightface italics, and small roman lightface capitals. A simple turn of a crank enables the Intertype operator to change from one magazine to another.

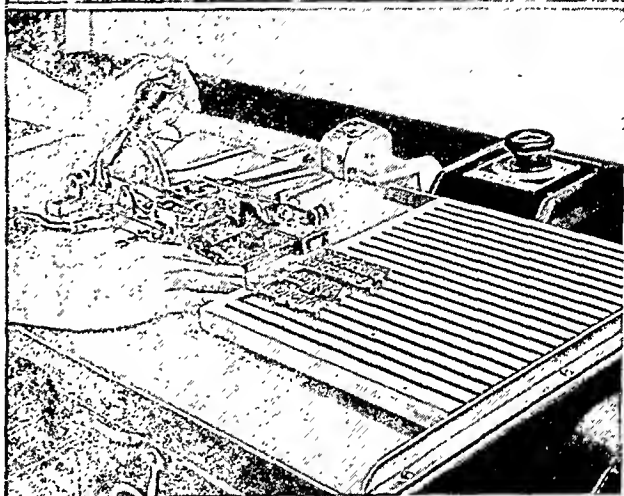
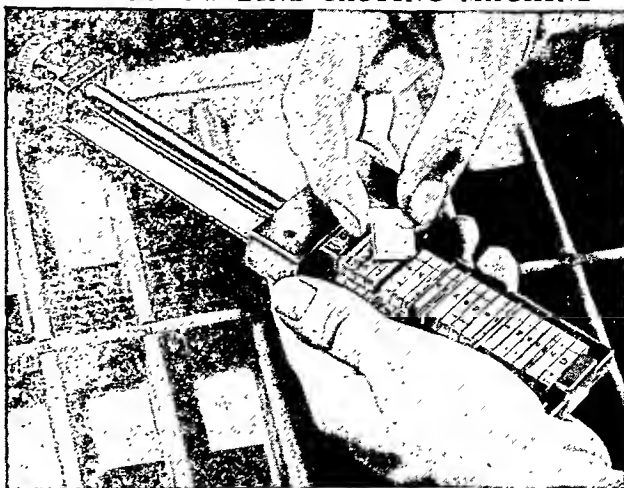
Special molding-disk equipment enables the Intertype to cast large display characters and borders. This kind of work is widely used in display advertising. Another device permits hand setting of large matrices, either with or without space bars. These hand-set lines are then cast on the machine. Other slight differences occur in the matrices themselves, which are interchangeable with those of the Linotype.

A third line-casting machine in common use is the Ludlow. This machine differs greatly from other line casters; and its method of use is different in important respects. The matrices are assembled by hand; and the words are spaced as in hand setting. Then it is cast as a slug line. Although many books have been set in Ludlow slugs, its chief use is in setting newspaper slugs and in all varieties of job and display composition. Short lines and combinations of several faces are easily cast.

Teletypesetting and Photo Composing

Among the newer aids to line casting is an automatic device called the teletypesetter. The name

THE LUDLOW LINE-CASTING MACHINE



At the top, a compositor is assembling Ludlow matrices in a stick. In the bottom picture he is locking the stick into a casting slot and forcing molten metal into the mold. Lines prepared by previous assembling and molding operations are stacked in the slotted galley, ready to be gathered into page form.

means "setting type at a distance," and the method is used when the same matter is to be set at several locations, such as in the printing plants of news magazines with regional editions or of newspaper chains.

The teletypesetter operator uses a keyboard to punch a code in a paper tape. The tape is then run through an automatic transmitter which changes the code into a series of telegraphic signals. In the receiving offices, reperforators receive the signals and convert them back into punched tapes. The tape, in turn, runs through a special device attached to the typesetting machine and sets the type in galley form. Sometimes the text itself is transmitted by teletype for use in proofreading the galley.

With the growth of offset printing methods has come demand for a machine which can compose or set a line in photonegative form. Several such devices are already in experimental use. Instead of matrices these machines generally use drawings of the letter or character. As a key is punched, the corresponding character flashes into view and is photographed by a camera attachment. Thus the machine produces a photonegative ready for use in offset lithography.

SCENES FROM THE LIVES OF MIGHTY LIONS



1. A young lion that has just killed an antelope dares the photographer to interfere. 2. A lioness gently carries her three-week-old cub in jaws that can crush the bones of a buffalo. Those spots on the cub are characteristic of young lions. 3. A mature lion displays the long mane typical of captive males. 4. The wild male (shown here with a seated female) has a shorter mane, for he often explores thorny thickets that pull out the hairs.

LION. On the plains of Africa, all the way from the Cape of Good Hope to Algeria and Ethiopia, lions continue to thrive. They find their best hunting on the plateaus of East Africa and the endless grasslands of the south. The most terrifying voice of the veld is their reverberating roar. They live in rocky dens, in thorn-tree thickets, or in tall grasses at the edges of streams.

The only wild lions outside Africa are the few that prowl the hot plains of Asia, from Iraq and southern Iran to northwestern India. In ancient Roman times, lions roamed also through Syria, Arabia, and southeastern Europe, and still earlier through Spain, France, Germany, and the British Isles.

A Ferocious Giant of the Cat Family

After the tiger, the lion (*Felis leo*) is the largest member of the cat family (see Cat; Tiger). A large male lion measures from nine and a half to ten feet, including the tufted tail, and stands more than three feet tall at the shoulders. He weighs from 450 to more than 500 pounds. His body is covered with short hair of yellow-brown, and a coarse mane grows on his head, neck, and shoulders. The female lacks the mane and is usually a foot shorter and more slender than the male.

The lion is well fitted to live by hunting and killing. Colored like sun-dried grass, it can slip unseen across the plains. Its huge jaws are so hinged that it can open its mouth fully 11 inches and can kill a zebra or a medium-sized antelope with one bite. Its longest teeth, the upper canines, measure from two to two and one-half inches. The sickle-shaped claws when fully extended from their sheaths may be three inches long. The lion can span nearly 30 feet at one bound, jump over a barrier almost 6 feet tall, or dash a short distance at more than 50 miles an hour.

When, What, and How a Lion Hunts

A lion usually hunts at night. It will eat carrion, but prefers fresh meat, particularly that of the zebra. Antelopes, giraffes, and buffaloes round out its diet. The lion likes to hide beside a trail leading to a water hole, then pounce upon the shoulder or flank of a passing zebra. It drives its claws deep into the flesh and kills its victim with a stabbing and crunching bite on the throat or the back of the neck. When stalking a herd, the lion creeps up from the leeward side taking advantage of every cover until the moment of the last quick rush.

Lions sometimes hunt in clans of from four to twelve and work as a team. The males roar loudly to scare up the game, while the females lie in wait along the trails to pounce on the scurrying animals. After the lionesses have had time to make their kill, the males stop roaring and come in to eat.

The Busy Life of a Lioness and Her Cubs

Lions usually pair for life. About 16 weeks after mating time, the young are born (from two to four in a litter) in a secluded spot selected by the mother. She guards them jealously and does not permit even the male to approach. Like the tomcat, he is inclined to kill his offspring. The newborn cubs are about the

size of large domestic cats. Their fur is frizzled and spotted. The males are marked also with stripes—several down the sides and one along the middle of the back. Though open-eyed and able to use their claws, the cubs are otherwise quite helpless. For the first two weeks they move about with their forelegs and drag the hindquarters. The mother weans them at three months, when they have a full set of teeth.

At five months, they weigh about 50 pounds, but are still as playful as kittens. They box and wrestle, and spring upon their mother's switching tail. With their growing claws, they rake deep gashes into tree trunks, but like their parents they seldom climb trees. At nine months, the spots and stripes disappear over most of the body.

When they are about 18 months old, the mother begins to teach them to hunt. She growls and snarls at their clumsy and frantic mauling when they first try to make a kill. But before many months, she will see them strike and kill with lightning speed.

At three years, the male has a conspicuous mane. Both sexes mature at from five to seven years. Lions reach their prime at eight, and then the mane of the male is at its best. After that they tend to decline. Many die before they are 15, though a few have been known to live more than 25 years.

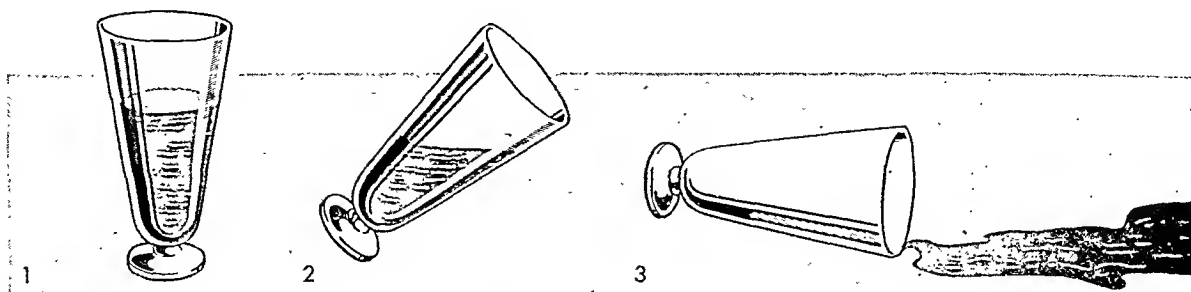
The Lion's Relations with Man

Usually the lion avoids man. But old ones too slow to catch game may become man-eaters. Occasionally, young lions get a taste of human blood and persist in killing. In British East Africa the story is still told of the two lions which in 1898 killed so many native workmen that for two weeks they halted the building of the Uganda railway. Some lions earn the enmity of farmers by preying upon their cattle.

For ages the lion has been a challenge to man's courage. One of the 12 labors of Hercules was the slaying of the Nemean lion (see Hercules). Samson, says the Bible (Judges xiv, 5-6), killed one with his bare hands. Lions in turn have killed more hunters than have any other African game animals. From Roman times they have been caged for circuses and zoos, and today most of those on display have been born in captivity (see Circus; Zoo).

Androcles and the Lion

The lion was featured in many ancient stories and legends (see Fables). Among them is the following story of Androcles and the Lion. One night in the first century, a Roman slave named Androcles, who had been carried to northern Africa, escaped from his master. At dawn he hid in a desert cave and fell asleep. A terrible roar awoke him, and he beheld a huge lion. The cave was the lion's den. Androcles waited to die. But the lion just stood there holding up one of its paws that had been pierced by a great thorn. Androcles bravely took the paw in his hand, drew out the thorn, and stopped the blood. For three years he and the grateful lion shared the cave. When Androcles decided to go back among his fellowmen, he was captured, sent to Rome, and thrown into the arena to fight beasts. A hungry lion sprang at him. But instead of killing him, it licked his hand. When Androcles recognized his friend, he leaned against his mane and wept. Deeply moved, the emperor set Androcles free and gave him a fortune. After that, whenever Androcles walked through the streets of Rome, the faithful lion followed him about like a dog.



A liquid is not rigid like a solid. It changes shape to fit a container (1 and 2), or, if free to do so, it spreads into a thin film (3). It always keeps the same volume; it does not expand indefinitely like a gas.

The Versatile LIQUID State of MATTER

LIQUID. Without liquids, the earth could not have rain, rivers, and oceans. Plants and animals could not obtain nourishment or distribute it throughout their bodies. Liquids can dissolve solid materials or capture and hold gases in solution (see Solutions). Thus they serve as a kind of transportation system for dissolved materials.

Liquids perform these useful functions because of the way they are put together. Like gases and solids, liquids are made up of the tiny particles of matter called molecules, and an attractive force called *cohesion* exists between them. In liquids this force is not strong enough to hold the molecules together in fixed positions as it is in solid objects. It can, however, hold them in a loose group or mass, which can change shape freely and flow around other objects. The molecules do not fly about separately as do those of a gas.

Leveling Tendency and Incompressibility

Every sizable mass of liquid tends to "flatten out," with its upper surface as low as possible. This happens because the force of gravity pulls each molecule down until it can go no lower. The upper molecules tend to push lower ones aside, and these yield until they are stopped by the sides of the container. This adjustment continues until the downward pull on the upper surface of the liquid is the same everywhere and (on any fair area) the surface is level.

Liquids are all but incompressible, because every molecule is as "close down" against its neighbors as

it can get. The only free space is that created by the heat vibration of each individual molecule (see Heat); and this vibration is energetic enough to withstand any ordinary pressure. Water is compressed only about one tenth by a pressure of 20 tons to the square inch. The only common way the volume of a liquid is altered is when a change of temperature affects the heat vibration.

Transmission of Pressure Within Liquids

In a liquid, pressure increases with depth because at any depth the liquid bears all the weight which lies above. This weight tends to force molecules sidewise as well as downward. Hence at any point in a given level, the pressure will be the same.

These facts explain *buoyancy*. An object thrust into a liquid must overcome the liquid's internal pressure. In doing so it loses weight. According to the law of Archimedes, the loss equals the weight of the liquid which the object pushes aside or displaces. (See also Hydraulic Machinery; Water.)

The Liquid Force Called Surface Tension

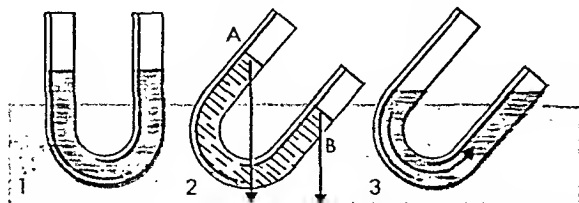
Many characteristics of liquids change at their surfaces, however, because of a force called *surface tension*. It consists of the inward pull exerted upon every molecule in the surface by its neighbors farther inside the liquid mass. The inward pull makes the surface act like a slightly stretched membrane, tending always to compress the underlying liquid into the most compact shape possible.

On a surface the most compact shape is a circle, and in free space it is a sphere. Hence if a limited quantity of liquid lies on any surface to which it does not cling or stick, it tends to form in a circular mass. When large drops lie free on a surface, the force of gravity tends to pull them down into the shape of a lentil or lozenge. With small drops the surface tension of the liquid prevails and keeps them almost spherical. If a liquid is falling through space as rain, for example, or if it floats within another liquid, as heavy oil in water, the liquid tends to form into spheres or drops.

Vaporization and Condensation

All the molecules in a liquid are constantly colliding with each other, and most of the collisions "cancel out"; that is, they tend to drive the molecules

WHY A LIQUID "SEEKS ITS LEVEL"



These diagrams show why the surface of a liquid is always level and as low as possible (1). If one part becomes higher than the rest (2), the higher part (A) weighs more than the lower (B). The excess liquid promptly flows downward, raising the lower part until both surfaces are even (3).

downward as often as upward and to one side as much as the other. However, some molecules receive blows which give them greater speed and drive them upward with enough energy to carry them free from the downward pull of surface tension. This process of escape is called *evaporation*, and the collection of escaped molecules becomes *vapor*. (Escape from a surface is called *evaporation* to distinguish it from the kind of escape that occurs during boiling, described later in the article.)

In an open vessel and at moderate temperature, the rate of evaporation depends upon the average rate of speed of the liquid molecules; and the average rate of speed constitutes the *temperature* of the liquid (see Heat). Since vaporized molecules have more than average speed, each escape of molecules reduces the average heat energy left in the liquid. The liquid will be cooled correspondingly, and further evaporation will be slowed unless more heat energy is supplied. (See also Evaporation.)

Cooling a vapor has somewhat reverse effects. At a certain temperature, the loss of heat energy enables cohesive force to draw some molecules together into droplets, and the droplets become larger until they are heavy enough to fall back into the liquid. This process is called *condensation*.

Vapor Pressure, Saturation, and Boiling

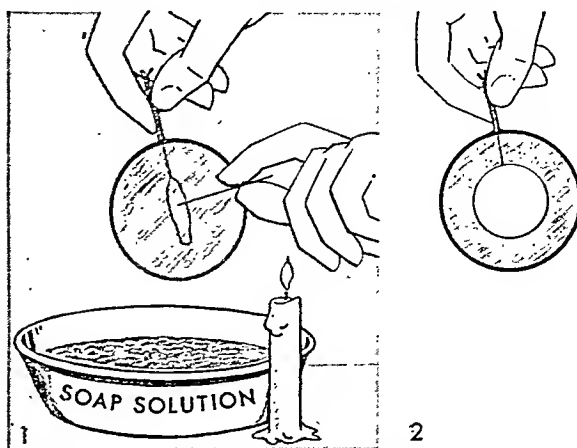
In a closed vessel, the rate of evaporation for any given temperature soon reaches a limit. This happens because in such a vessel the vapor molecules cannot fly away. They strike all surfaces of the confining vessel, and many of them fly back into the liquid. At length a balance is reached between the molecules that have escaped and those that have returned. The space will hold no more vapor molecules. This condition is called *saturation*, and the vapor is said to be exerting *saturated vapor pressure* upon the liquid. (Other terms for this pressure are *saturation pressure* and *vapor tension*.)

The saturation pressure in a closed vessel rises with increase of temperature, because the vapor molecules fly faster and strike the walls harder and because, while the temperature is being raised, more molecules evaporate than return to the liquid. When some higher temperature is reached, the pressure in the liquid becomes equal to the saturated vapor pressure. Then molecules of sufficient speed, which happen to fly together at the same spot within the liquid, can withstand pressure from above. Thereupon they form a bubble and start pushing back the surrounding liquid. These bubbles rise to the surface and burst, letting the vapor escape.

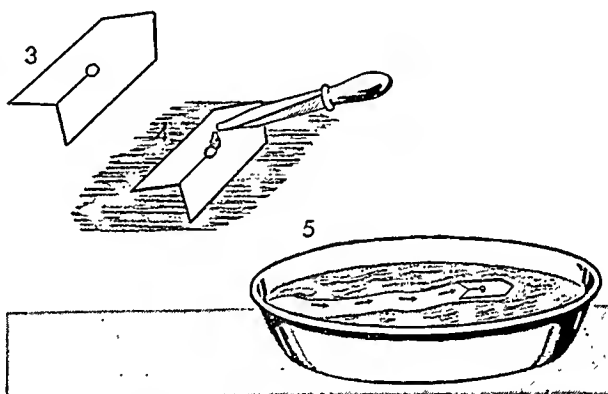
When a liquid bubbles in this way (but not from trapped air bubbles escaping), it is said to be *boiling*, and the temperature at which this occurs is called the *boiling point*. (Another term for boiling is *ebullition*.) Thus, boiling is the vaporization of liquid throughout the volume of the liquid.

The boiling point depends on the pressure exerted on the liquid. In an open vessel this pressure is exerted by the atmosphere, and applying heat beyond

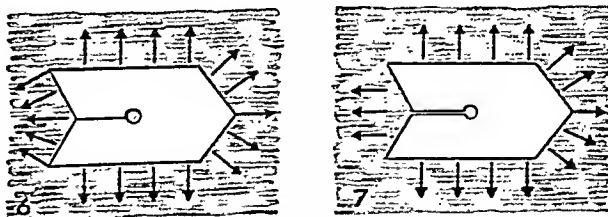
EXPERIMENTS WITH SURFACE TENSION



To show the tension of a liquid film, hang a loop of thread in a wire ring and fill the ring with a film of soapy water to which the loop of thread will cling. Now break the film inside the loop with a hot pin (1). The loop will snap out into a perfect circle, drawn equally in all directions by the tension of the surrounding film (2).



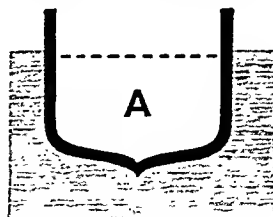
To show how wetting agents (detergents) reduce surface tension, cut a boat-shaped slip from heavy paper then cut a hole and a slit on the slip as shown (3). Lay the slip on water and place one drop of a wetting agent in the hole (4). Soon the boat starts moving ahead as though by magic (5). The diagrams below show why.



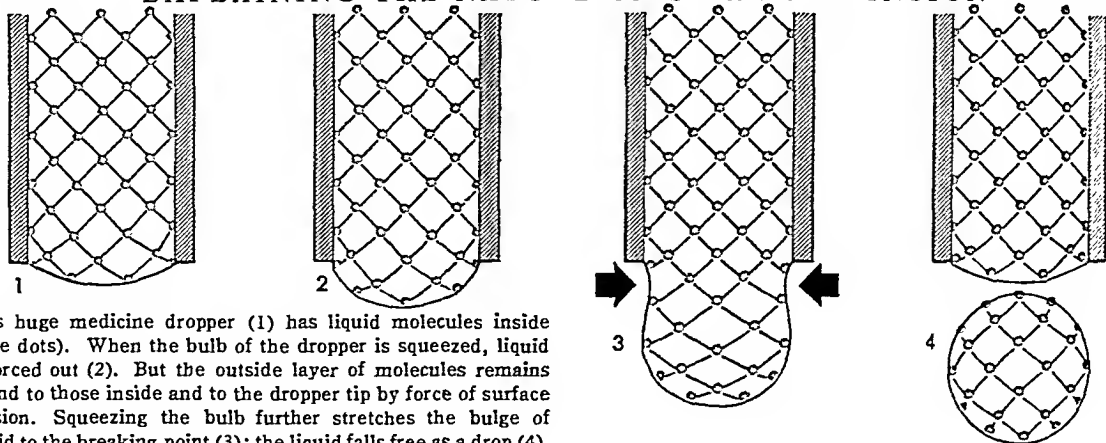
Usually surface tension pulls equally at all sides of the boat, and the boat does not move (6). Soon the wetting agent seeps back through the slit and weakens the pull on the rear edge. Then the unbalanced pull on the front draws the boat along (7).

ARCHIMEDES' RULE

This cross section of a ship provides a simple illustration of Archimedes' law as it applies to floating objects. Water enough to fill the space (A) below the dotted line would weigh exactly as much as the whole ship.



EXPLAINING THE NATURE OF SURFACE TENSION



This huge medicine dropper (1) has liquid molecules inside (blue dots). When the bulb of the dropper is squeezed, liquid is forced out (2). But the outside layer of molecules remains bound to those inside and to the dropper tip by force of surface tension. Squeezing the bulb further stretches the bulge of liquid to the breaking point (3); the liquid falls free as a drop (4).

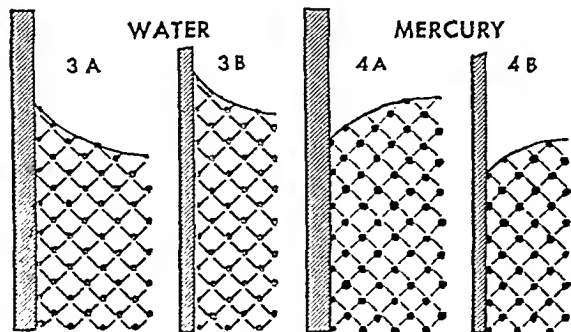
the boiling point does not make the liquid hotter. The molecules simply escape faster and in greater number.

In a closed vessel the pressure builds up as the temperature rises, and the liquid must be correspondingly hotter before it can boil. Pressure cookers cook food faster than open vessels because the higher pressure makes water reach a higher temperature before it boils. Continued heating in a tightly closed vessel may build up pressure enough to produce an explosion, unless some outlet is provided. Most vessels of this type have some device such as a safety valve to relieve dangerous pressure.

Reducing the pressure in a container by pumping off the molecules as they escape makes vaporization easier and lowers the boiling point. Vacuum pans use this principle for boiling away water from solutions of materials, such as evaporated milk, which would be injured or destroyed by the heat of ordinary boiling (see Sugar). Water can be boiled at 32° F. (usually the temperature of freezing) if the pressure is reduced to 4.6 mm. of mercury.

Adhesion, "Wetting," and Mixing

When a liquid comes in contact with a solid, the reaction depends upon the attraction between the



Imagine a tube and water enlarged until the molecules show as dots (3A). Some water molecules will adhere to the glass above the water level and draw others upward (3B). Mercury will not adhere to glass, so it is drawn inward and downward by surface tension (4A, 4B).

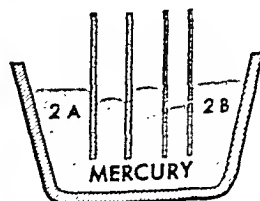
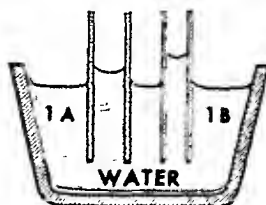
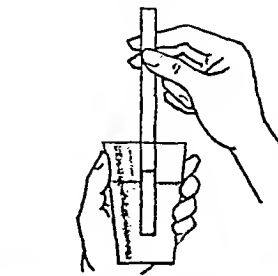
liquid and the solid. (This attraction between unlike substances is called *adhesion*.) A drop of water will spread out in a thin film over perfectly clean glass, because the force of *adhesion* between water and glass is stronger than the force of *cohesion* between the water molecules. The water "wets" the glass. Water on oilcloth forms into drops, because there is virtually no adhesive force between oil and water. They "do not mix."

Similar results occur when the surface of a solid rises above its contact with the surface of a liquid. If the force of adhesion is greater than the force of cohesion, the liquid surface curves up at the line of contact. In a very small tube, the adhesive force is great enough to lift all the liquid in the tube above the general surrounding surface. If adhesion is weaker than cohesion, the surface curves down, as when mercury is in contact with glass.

Certain chemicals dissolved in a liquid may weaken its cohesion and reduce the surface tension. The weak forces of adhesion with normally uncongenial substances can thus make the liquid adhere to solids or

TWO RESULTS OF CAPILLARITY

If a glass tube stands in water, the process of capillarity draws water up into the tube. The surface of the water in the tube is concave (1A). The smaller the bore of the tube, the higher the water is drawn (1B). Mercury does not wet glass, and the effects are reversed (2A, 2B).



make it mix with liquids. The chemicals which have this effect on liquids are called *detergents*, or wetting agents. (See also Soap.)

Capillary Action and Osmosis

The surface tension of liquids explains the phenomenon called *capillarity*. As shown in diagrams on the preceding page, capillarity raises or depresses the level of a liquid in small tubes and at the solid edges of containers. The liquid rises if the force of adhesion is greater than cohesion within the liquid; if cohesion is stronger, the liquid is depressed. The curved surface in a tube is called a *meniscus* (see Capillary Action).

Another phenomenon peculiar to liquids is *osmosis*. If a strong solution of sugar, salt, or other substance is separated by a porous membrane from a weaker solution or from plain water, water will pass through the membrane into the stronger solution. The liquid particles, or molecules, on both sides of the membrane are hitting against it. But the bombardment on one side is carried on in large part by the dissolved particles which are too large to get through; on the other side the missiles are mostly or entirely water molecules, which can pass through easily. This one-way passage of water molecules gives the strong solution more water than it loses, and its volume increases (for picture, see Plant Life; see also subhead "Drawing in Water by Osmosis").

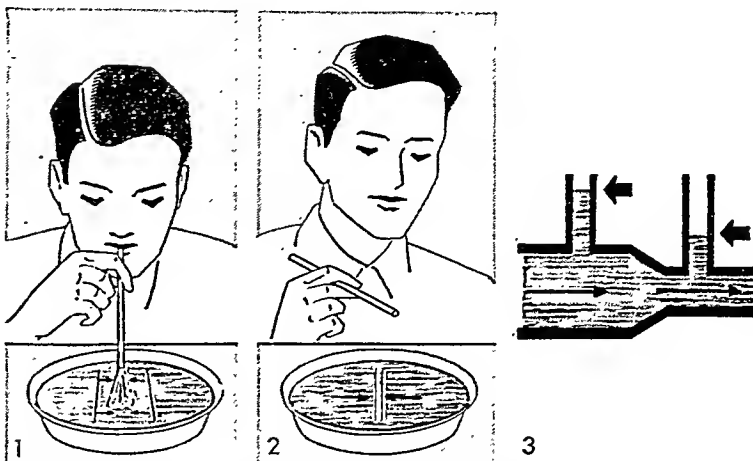
LIQUID AIR. Just as steam becomes water if its temperature falls below 212°F ., so air becomes liquid when its temperature is reduced to -312°F . It looks like water, but it behaves very differently. If poured on a block of ice it boils, sending off clouds of vapor. At -362° it becomes a solid.

Liquid air is a mixture of liquid oxygen, nitrogen, and rare elements such as helium and neon. If carbon dioxide is in the air, it crystallizes as a solid. Liquid nitrogen evaporates more readily than liquid oxygen and comes off first when liquid air starts to evaporate. The residue becomes increasingly richer in oxygen.

Air is liquefied commercially to obtain oxygen, nitrogen, the rare gases, and for use as a refrigerating agent. Liquid air also has explosive power, because as it evaporates it exerts great pressure. Air is liquefied by being forced through compressors into cooling coils at pressures of about 3,000 pounds to the square inch. Then it passes into a chamber where it suddenly expands. The acute cold caused by this expansion liquefies the air.

Liquid air can freeze and destroy a human finger in two seconds or in a few moments make an iron pan so brittle with cold that it can be broken by hand.

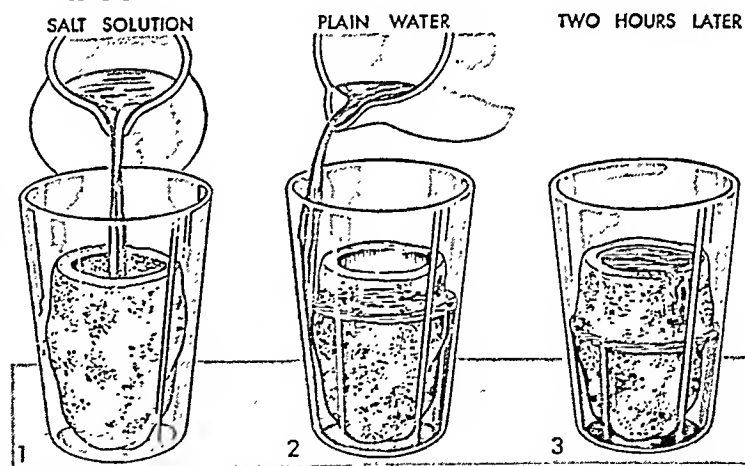
BEHAVIOR THAT SEEMS TO "DEFY NATURE"



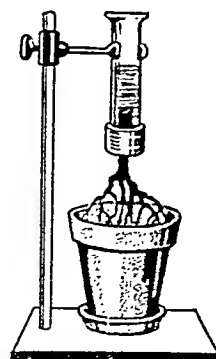
Place two straws on water. Blowing between them (1) will make them move together (2). The flow of air sets a current flowing between the straws, and as the liquid moves its pressure is reduced (the Bernoulli effect). Then the unchanged pressure of the surrounding liquid forces the straws together.

A Venturi flow meter (3) uses the same effect. When water passes from the wider to the narrower pipe, its velocity increases and its pressure is reduced. The result is shown by the different heights of water in the upright pipes.

A POTATO REVEALS THE FORCE OF OSMOSIS



To show how cells and tissues exchange solutions through their walls, place a potato with its inside gouged out in a glass and fill most of the cavity with salt water (1). Next fill the glass around the potato with plain water until level with the salt water (2). Within an hour or two, the potato will have filled to overflowing (3). The force of osmosis exerted by the salt water has drawn fresh water through the potato.



At the right, a glass tube is sealed to the cut stalk of a plant and the roots are placed in water. Watery sap slowly rises in the tube, drawn from the soil by osmotic force.

LISBON, PORTUGAL. Seven miles from the Atlantic, up the wide channel of the Tagus River, lies Lisbon (or *Lisboa*), capital of Portugal and westernmost seaport of continental Europe. The approach from the sea is like a trip up the neck of a great bottle, for immediately above the city the river broadens out into a tidal lake, 4 to 8 miles wide and 11 miles long, forming one of the best harbors in the world. Here great steamers from South America and from Portugal's distant colonies in Africa or the East Indies lie at anchor alongside British or United States merchantmen, while native fishing boats with bright-painted hulls and three-cornered sails bring in their catch, with songs and shouts from the half-naked dark-skinned crews. The wharves and quays stretch along the northern banks of the river and lake for five miles. Beyond them the city itself rises in terrace upon terrace of white houses and green parks, backed by the granite mountains of Cintra.

Lisbon is almost entirely a modern city, for the great earthquake of 1755, which killed about 40,000 of its inhabitants, left only a small section of the town standing. This section contains, however, many interesting relics of ancient days. Here in the cathedral, first built in 1150, is the tomb of St. Vincent, patron saint of Lisbon, and in the cathedral grounds near by are kept a pair of ravens, popularly believed to be descendants of the birds which, according to legend, guided the saint's vessel to the city in the 3d century.

The modern part of Lisbon is not surpassed in beauty by any European capital. The streets are straight and broad, the finest of all being the Avenue of Liberty, a mile long and 300 feet wide, with a double row of shade trees down the middle; its name commemorates the freeing of Portugal from Spain in 1640. Between the terraced levels of the city elevators carry people up and down. Lisbon also boasts one of the finest botanical gardens in Europe.

Few large cities are more colorful. Modernistic buildings soar up between ancient red-roofed, white-walled houses. Fashionable people rub elbows with sturdy fishwives, who balance dripping trays of fish on their heads. Fruit vendors and laden donkeys wind their way between streetcars and automobiles.

Lisbon was probably founded by the Phoenicians, for it was a flourishing town before the Romans occupied it. The Moors held it from 711 to 1147. Vasco da Gama sailed from Lisbon for his voyage around Africa in 1497, and the Spanish Armada started from here on its ill-fated voyage in 1588, while Spain ruled the city. Lisbon was the chief scene of the Revolution of 1910, when warship crews revolted, shelled the palace, and drove King Manuel from Portugal.

During the second World War neutral Lisbon was Europe's chief outlet. It became the terminus for

planes from the United States. Refugees from war-torn nations swelled its normal population.

Manufactures include tile, pottery, fertilizer, textiles, and canned food. Exports are wine, fish, and cork. Population (1950 census), 783,226.

LISZT, FRANZ (1811-1886). The most brilliant pianist of his day, Franz Liszt was also a distinguished composer, conductor, and teacher. He made a further contribution to music through his encouragement of younger composers.

Liszt was born Oct. 22, 1811, at Raiding, Hungary. His father, Adam Liszt, served the Esterházy family as their steward at Raiding. This family had been patrons of music for generations. Liszt's mother, Anna Lager, was an Austrian.

Adam Liszt was a talented amateur and taught his son to play the piano. At the age of nine Franz gave a concert at Oedenburg, near Raiding, and another at Prince Esterházy's palace. He so impressed the prince and his friends that they subscribed money to support and educate him for six years. Liszt went to Vienna, where he studied with two well-known teachers, Karl Czerny and Antonio Salieri. He gave his first public concerts in Vienna in 1822, in Paris in 1823, and in London in 1824.

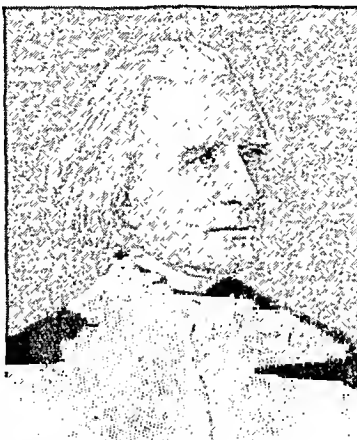
Everywhere he was lionized. His playing moved the great Beethoven to kiss him. In London, King George IV received him at Carleton House. In Paris, where he lived for 12 years, he was sensationally successful.

Liszt eloped to Geneva with the Countess d'Agoult in 1835. They had three children, Blandine, Cosima (who became the wife of Hans von Bülow and then of Richard Wagner), and Daniel. Triumphant concert tours dominated Liszt's life until October 1847, when he made his last appearance as a virtuoso.

From 1848 to 1859 he was conductor at the Court Theater at Weimar. Here he championed Wagner and produced his music dramas. He introduced and revived the works of other contemporary composers. He also established himself as a composer and a teacher.

At 50 he retired to Rome. He received minor orders in the Roman Catholic Church, with the title abbé, in 1865. In 1869 he began to visit Weimar regularly. The Hungarian government named him president of the Academy of Music at Budapest in 1870. Thereafter he divided his time between Rome, Weimar, and Budapest. After a spectacular "jubilee tour" to Paris, London, and other cities in 1886 he died at Bayreuth of pneumonia July 31.

Among Liszt's works are 13 symphonic poems, including 'Les Préludes'; two symphonies, 'Faust' and 'Dante'; 20 Hungarian rhapsodies; 55 songs; 'Transcendental Études' for piano; two oratorios, 'The Legend of St. Elizabeth' and 'Christus'; several 'Mephisto' waltzes, and many transcriptions for the piano of operas, songs, and instrumental works.



FRANZ LISZT

HONORS for WRITERS and ILLUSTRATORS

LITERARY AWARDS. A book that wins a prize wins readers. Since about 1925 the number of prize awards for writing has grown so that now over a hundred prizes are given annually for writing in the United States alone. These literary prizes usually take the form of awards of money, medals, certificates, or scrolls. Sponsors for the awards include individuals, regional groups, colleges, publishing firms, and even the large motion-picture companies. The prizes fall into various classifications—annual awards, special contests, or fellowships for work under way.

Newbery and Caldecott Awards

There are many annual literary awards in the field of juvenile literature. Most important are the Newbery and Caldecott medals presented by Frederic G. Melcher. Mr. Melcher's enthusiasm about books for boys and girls began when he was a bookseller in Boston in the late 1890's. In 1922 he offered the first John Newbery Medal for the most distinguished contribution to literature for American children and in 1938 the first Caldecott Medal was given for the most distinguished American picture book for children (see Caldecott; Newbery; also Awards table in Fact-Index).

The Newbery and Caldecott medals are awarded each year by the children's and school librarians belonging to the American Library Association. These librarians suggest the books of the past year they think most worthy of this high honor, and the final choice is made by a committee of librarians who vote by mail. Public announcement of the books chosen by the committee is made in the spring. The medals are awarded at the annual conference of the American Library Association. The fortunate authors and artists and the children's book editors from the houses that publish the winning books are introduced to the librarians attending the convention. Boys and girls, as well as grownups, watch eagerly for the announcement of the winners of these two medals each year.

Other Juvenile Awards

Each spring since 1937 the New York *Herald Tribune* has sponsored a Children's Book Festival and awards three prizes of \$200 each for the best books of that spring for young children, middle-age children, and young people. People prominent in public affairs and experts in children's books serve as the jury.

Another annual juvenile prize is given by the Julia Ellsworth Ford Foundation. This fund was established in 1934 to encourage originality and imagination in children's literature. Since 1945 it has consisted of a prize of \$1,250, and the manuscript is selected by a board made up of people who are well-versed in children's literature.

The Child Study Association of America offers an honorary award each year to a book for young people dealing in a realistic manner with contemporary problems. This was first given in 1943. The *Junior Scholastic's* Gold Seal Award has been given irregularly since 1942 to those juvenile books that "are considered to be an enriching experience in the lives of young Americans."

A recent trend is the awarding of prizes to books selected by children themselves. Since 1940 the Pacific Northwest Library Association has given an award which was made possible by a gift from a blind Seattle bookseller, the late Harry Hartman. The prize-winning books are selected by a direct vote of boys and

girls in the 4th to 8th grades in the schools of British Columbia, Idaho, Montana, Oregon, and Washington. More recently the Boys Clubs of America have been taking a poll in nearly fifty boys clubs throughout the country and since 1947 have awarded medals and certificates to the books selected.

Nobel Prize for Literature

The oldest literary prize recorded is the Newdigate Prize, established in the 18th century and last given in 1939 at Oxford University, England. However, the Nobel Prize for literature is the highest in value and in honor. First given in 1901, it is one of five prizes founded by Alfred Bernhard Nobel, a Swedish

industrialist. The four other awards are given for Physics, Chemistry, Medicine, and Peace. The Nobel Prize for Literature, decided upon by the Swedish Academy in Stockholm, consists of a gold medal and prize money amounting to approximately \$40,000. It is given annually on December 10th, the anniversary of Nobel's death. Four American writers have won this international honor, Sinclair Lewis, Pearl Buck, Eugene O'Neill, and William Faulkner. During the second World War 28 Nobel Prize winners were living in the United States, including such distinguished literary figures as Sigrid Undset, Thomas Mann, and Maurice Maeterlinck. Frequently the winner of the Nobel Prize is a European writer of distinction whose work is little known in the United States. The winning of this high honor brings his work to the attention of the American reading public.

Pulitzer Prizes in Letters

Of the annual American literary awards, the most important are the Pulitzer Prizes in Letters. These date from 1917 when they were established by the terms of the will of Joseph Pulitzer, editor of the St. Louis *Post-Dispatch* and the New York *World*. These prizes cover the fields of the novel, drama, history, biography, and poetry. For each group \$500 is available annually, but the awards are not necessarily

AWARD TO CHILDREN'S AUTHORS



This bronze medal is named in honor of John Newbery, 18th-century London bookseller and first publisher of children's books.

given each year in each field. The trustees of Columbia University award the prizes.

Other Annual Awards

Another distinguished annual award, the Carey-Thomas Award, goes to the publisher who plans the most successful publishing project of the year. This award was established in 1942 by the *Publishers' Weekly*, the magazine of publishing and bookselling. It was named for two early American publishers, Matthew Carey of Philadelphia and Isaiah Thomas of Worcester, Mass.

The Anisfield-Wolf awards are given annually by Mrs. Edith Anisfield Wolf in memory of her father. They are offered for sound and significant books on the subject of racial relations in the contemporary world and consist of two prizes of \$1,000 each.

Publishers' Prizes

Among the annual prizes for adult books, those given by leading publishing houses have proved to be very successful in bringing new talent to light. The Harper Prize Novel Contest has been conducted in alternate years since 1923. This prize now amounts to \$10,000 and gives recognition to a work of fiction of outstanding merit. Among the publishers offering prizes of considerable monetary value are Dodd Mead, Doubleday, Dutton, Houghton Mifflin, and Norton.

In 1944 Metro-Goldwyn-Mayer offered an annual award "for a novel considered most outstanding by a distinguished board of judges." The prize offered is a minimum of \$150,000, a maximum of \$250,000.

Next in money value is the Book Contest offered by the Christophers, with prizes totaling \$30,000. They also offer a \$10,000 Drama Awards Plan. The Christophers is a nonprofit movement which endeavors to restore Christian values to all phases of public life. Three prizes are offered for book-length manuscripts based on Christian principles, not necessarily religious; and three prizes for play-length scripts.

Fellowship Awards

Literary prizes sometime take the form of fellowships—sums of money to support a writer during the time he is writing a book. Best-known perhaps are the John Simon Guggenheim Memorial Fellowships, established in 1925 by the late United States Senator Simon Guggenheim and his wife in memory of their son. The fellowships, which vary in number each year, are awarded in the fields of art, music, history, science, creative writing, and philosophy. In most cases the sum does not exceed \$2,500 a year.

Other fellowships include the Eugene Saxton Memorial Fellowships, established by Harper & Brothers in memory of the man who for many years was their head editor; the Houghton Mifflin Literary Fellowships; the Dodd Mead Intercollegiate Literary Fellow-

ships; the Farrar Straus Regional Fellowships; and the Bruce Fellowships for Fiction.

Some American universities with creative writing departments offer literary awards, usually through the generosity of an alumnus or alumni groups. Since 1936 the University of Michigan has given the Avery Hopwood and Jule Hopwood prizes to "students who perform the best creative work in the field of dramatic writing, fiction, poetry, and the essay." These awards have varied from \$20 to \$2,000 and many of the win-

MEDAL FOR ILLUSTRATORS



This bronze medal is named in honor of Randolph Caldecott, 19th-century English illustrator, famous for drawings for children's books.

ning manuscripts have been published. Stanford University, through its Dramatists Alliance, gives seven drama awards. Several publishers sponsor prizes at a given college, such as G. P. Putnam's Sons, at the William Allen White School of Public Information at the University of Kansas and Rinehart & Co., at the University of Iowa.

Regional Prizes

Literary awards, usually of a nominal amount, are given at the many writers conferences held in various parts of the country. Among the best known are the Bread Loaf Conference at Middlebury, Vt., and the Midwestern Writers Conference in Chicago.

Regional literary prizes are given in different sections of the United States. The California Medals, given annually by the Commonwealth Club of California, have been awarded since 1931. The Friends of American Writers, a Chicago foundation, give a cash prize of \$750 annually for a book about the Middle West. The Southern Authors' Award, sponsored by the Southern Women's National Democratic Organization of New York, offers an annual award of \$150 for a distinguished book by a Southern author on some phase of Southern life. The Ohioana Awards and those of the Texas Institute of Arts and Letters are representative of this trend. There is even an honorary Mystery Novel Award, called the Edgar Allan Poe Award, given by the Mystery Writers of America, Inc.

Poetry and Short-Story Prizes

Many prizes are given for poetry. The largest in monetary reward is the \$1,000 Bollingen Prize in Poetry. Arrangements for its presentation were formerly made by the Library of Congress and now by Yale University. It was presented first in 1949. The Pulitzer Prize in Poetry and the Yale Series of Younger Poets are important, while the prizes given by *Poetry Magazine*, The Poetry Society of America, and the Academy of American Poets are valuable honors.

The O. Henry Memorial Award for short stories began in 1919. There are four money prizes and the winning stories, together with others selected, are published in annual volumes. Since 1946 the *Atlantic Monthly* in cooperation with Metro-Goldwyn-Mayer has conducted a story contest to encourage new writers called "Atlantic First." This prize is \$1,500.

A CHILDREN'S WORLD of BOOKS

LITERATURE FOR CHILDREN. Between the day of the 'Orbis Pictus' (the World in Pictures), the first picture book for children, and this Pictured Encyclopedia, millions of children's books have been published. Some of them have been with pictures and some without. There have been miniature books, medium-sized books, oversized books, thin books and thick ones, dull books and fascinating ones. Many of them were in such perishable form as to have vanished entirely. Others which have survived are so precious they are to be found only in the British Museum, in the library of a great university, or in the private library of some fortunate possessor of old books. Early children's books are rarities of great interest to collectors and are eagerly sought after all over the world.

In the preface to 'Orbis Pictus', the author, Johann Comenius, the great 17th century educational reformer, states as the twofold purpose of his book "to entice witty children" and "to remove scarecrows from wisdom's garden." These delightfully prophetic words first appeared in High Dutch and Latin when the book was published in Nuremberg in 1657. Illustrated with crude woodcuts, it was translated by Charles Hoole into English the following year. Many editions were published in response to the interest aroused by the discovery that pictures are all-important in books designed for the pleasure of children in reading the world's story.

The cuts for 'Orbis Pictus' were made by Michael Endter of Nuremberg. Comenius wrote him, again prophetically, of the part that pictures were to play in the making of books for children:

"This work belongs to you; it is entirely new in your profession. You have given a correct and clear edition of the 'Orbis Pictus' and furnished figures and cuts by the help of which the attention will be awakened and the imagination pleased. This will, it

is true, increase the expense of publication, but it will be certainly returned to you."

Pictures an Incentive to Reading

Discrimination in the choice of pictures which are to be an incentive to reading is a comparatively recent development, but it plays an important part in any real consideration of literature for children. Today children's librarians and book buyers select books for both literary and pictorial quality. It is impossible to think of certain books without thinking of the pictures originally designed for them. The pictures have virtually been written into the book by the artist as well as by the author.

Sir John Tenniel's delightful pictures for 'Alice in Wonderland' and A. B. Frost's entrancing pictures for 'Uncle Remus' are excellent examples of this written quality which may exist in an artist's work. A more recent example may be taken from the illustrations by Dorothy Lathrop for Rachel Field's 'Hitty', the adventurous tale of an American wooden doll of a hundred years ago. This is a book which in both story and illustration has the charm of real literature for children of the present day.



"There was a painful picture of a man being swallowed by a large fish."
A picture from Rachel Field's delightful story, 'Hitty' (Macmillan).

One of Miss Lathrop's drawings for 'Hitty' appears on this page. Several other present-day illustrators have the wonderful ability of collaborating with the author so that the book becomes truly the product of their joint efforts. Children who read these books remember forever after the story not in words alone but in pictures as well. They remember how Alice, Uncle Remus, and a host of other beloved characters looked, because the artist supplied a vivid, real picture for the eye to supplement the author's word pictures.

The First Storybooks

The first storybooks designed for children's entertainment were published in England in the middle of the 18th century by John Newbery. Oliver Goldsmith is believed to have been the author of the most

famous of them, 'The History of Goody Two-Shoes', (1765). In 'The Vicar of Wakefield', Goldsmith describes the genial publisher of these gay little books, bound in "flowery and gilt" Dutch paper, as "the philanthropic bookseller of St. Paul's Churchyard." An American reprint of this celebrated children's book was published by Isaiah Thomas of Worcester, Mass., and two copies of it are known to be still in existence in America. Leigh Hunt gives a boyhood memory of Newbery in 'The Town', and Charles Welsh wrote a life of him called 'A Bookseller of the Last Century'. Newbery published the first collection of Mother Goose rhymes in England, about 1760, under the title 'Mother Goose's Melody', or 'Sonnets for the Cradle'. In America, he is not only remembered by reprints of his books, but every year a medal bearing the name of John Newbery is awarded to the author of the most distinguished book published for children in the preceding year. The Newbery award was first made in the year 1922 to the author of 'The Story of Mankind', a book illustrated as well as written by Hendrik Van Loon, whose pictorial maps and animated drawings in color supply a desirable imaginative element in children's histories and books of travel.

The First Fairy Tales

Myths and fairy tales, poetry and song, are the bed-rock of literature. The first book of fairy tales written and published for children appeared in France in 1697, under the title 'Contes de ma Mère l'Oye' (Tales of My Mother Goose). Charles Perrault, a member of the French Academy and a friend of La Fontaine, retold some of the fairy tales, then so popular at the court of Louis XIV, for his own little son, who made a book for other children. Cinderella, Bluebeard, and Puss-in-Boots proved as fascinating to English-speaking children as to the French when they were translated some 30 years later. It adds an element of human interest to these fairy tales to know that it was the same Perrault, who, as a lawyer, claimed for the children of Paris their right to continue to play in the gardens of their kings—even in that of the Tuileries in the reign of Louis XIV when Colbert sought to reserve it for the king and his court. Perrault himself lived close to the Luxembourg gardens, where children still play the old games, sing the old songs, and watch the characters of the old tales he reclaimed for them live again in their little out-of-door theater under the trees.

The fairy tales of the Countess d'Aulnoy, a lady of the French court, were published in France at about the same time as those of Perrault, but were translated and published in England several years earlier (1707). Elizabeth MacKinstry has illustrated in colors a selection of these tales in English, called 'The White Cat and Other Old French Fairy Tales'. She has imparted to her work a picture-book quality of French life of the period which conveys to children all the charm of stories some of their elders may consider too sophisticated for their reading. French

fairy tales of the 18th century and French picture-books of the 19th, notably those of Maurice Boutet de Monvel—'Vieilles Chansons', 'Filles et Garçons', 'Jeanne d'Arc', 'La Civilité'—La Fontaine's fables, and others have contributed not merely life and gaiety, but clarity and precision to the formation of a special literature for children which springs from life rather than from an ingenious plan.

Stories with a Purpose

John Locke had a plan which called for teaching children the alphabet and many other things by playing games. He invented many ingenious devices, but he did not lay as much stress upon books in childhood as he did upon games and physical training. He considered 'Aesop's Fables' the best book to put into a child's hands, and recommended choosing one with pictures in it. Unfortunately Thomas Bewick's fine woodcuts, implying more than the words, were not then in existence. The edition of the fables which Bewick illustrated was published about 1780. Locke knew that pictures were essential if children were to be attracted to reading the fables for themselves. He also recommended 'Reynard the Fox' as a book for children, but he warned parents against all fairy tales, romances, and ghost stories, as filling children's heads with "perfectly useless trumpery." Locke's plan of education gave the imaginations of children small chance to grow and stretch in childhood.

Later in the 18th century came Rousseau with another plan, embodying some of the same features with others entirely his own. Rousseau had great enthusiasm and the book he wrote, 'Émile' (1762), is more readable than Locke's 'Thoughts on Education' because it is written about a boy called Émile who has a tutor and spends his boyhood out-of-doors. Émile is allowed no books at all to read until he is 12, and then he is given 'Robinson Crusoe' and is supposed to relive Crusoe's experience.

To Rousseau, and to those who believed in his theories, Émile represented "the natural boy." Considerably more than a century later, Mark Twain provided a living natural boy who has since passed from the Mississippi River country to many lands. Huckleberry Finn bears very little relation to Émile, except that he shows how different a boy can be when he is drawn from life rather than made to fit into a theory. Rousseau's ideas created a great stir in France and England and led to the writing of many stories as well as essays to fit educational theories.

Thomas Day's 'Sandford and Merton' (1783) is a landmark among children's books with a purpose. Mr. Day, who was a friend of the distinguished writer on education, Richard Edgeworth, took his theory largely from Rousseau, but the life of his child characters was derived from a writer with a gift of humor and a sympathy with childhood far ahead of his time. Bad little Tommy and good little Harry of 'Sandford and Merton' are indebted to that small boy, Henry Earl of Moreland, who lives

in 'The Fool of Quality'. The author of this novel, Henry Brooke, reflects Rousseau's ideas, but for the first time he describes a boy with "a sense of fun" and he should be remembered for this notable achievement.

To this period also belongs Mrs. Trimmer's 'The Story of the Robins'. Originally published as 'Fabulous Histories', it represents one of the first attempts



This is the young Queen who was turned into 'The White Cat'.

to instil in the minds of children kindness to birds and animals, and presents an interesting point of comparison with the work of Thornton Burgess for children in the 20th century. Mrs. Trimmer was also among those who made liberal use of pictures to interest children in historical subjects, and certain pictorial charts and maps of the present day reflect her work.

But of all who wrote under the Rousseau impetus to child study, Maria Edgeworth stands out as the best story-teller. Her 'Parents' Assistant' is not a treatise, but a genuine story-book which has been reprinted again and again since it was first published in 1796. Sir Walter Scott, Ruskin, Anne Thackeray Ritchie, Agnes Repplier, and many others bear testimony to Miss Edgeworth's genius for invention and dramatization, and her command of English. Many of her stories are as good today as they ever

were, for in writing for children she never failed to supply plenty of incident and clearly defined character and plot. Several of her stories, with an illuminating introduction by E. V. Lucas, are included in his 'Old Fashioned Tales'. This volume includes also a selection from 'Holiday House', by Catherine Sinclair—"the first children's book," says Mr. Lucas, "in which the modern spirit manifests itself." A comic giant appears in the story—"a giant so tall that he was obliged to climb up a ladder to comb his own hair"—a giant who is the forerunner of a glorious company of fun-makers such as Dr. Heinrich Hoffman with 'Struwpeter' (Slovenly Peter), Edward Lear with his 'Book of Nonsense', and Frank R. Stockton with his entertaining stories of giants, wizards, and good-natured griffins.



An enchanted footman holding 'The Pot of Carnations'. This and the other drawings by Elizabeth MacKinsty on this page are from 'The White Cat and Other Old French Fairy Tales' by Mme. La Comtesse d'Aulnoy, arranged by Rachel Field (Macmillan).

The First Folk-Tales

Before giants could appear as comic figures, they had to become naturalized in familiar folk-tales. The book which more than any other contributed to this end and to the shaping of a new literature for children of the 19th century was 'Kinder und Hausmärchen' (Children's and Household Stories), by the Brothers Grimm, published in Germany in 1812.

The two brothers who collected and wrote down these stories in many different dialects were scholars. Jakob, the elder, knew more about the history of words than any man of his day. Fully aware of the value of folk-tales as records of social life and of primitive scientific beliefs, they devoted 13 years to transcribing their stories without changing a word. In one of the villages



Here is the weak and greedy King from 'Graciosa and Percinet'.

they found a woman with "a perfect genius for story-telling," says Jakob Grimm. "Her memory kept a firm hold on all sagas; she told her stories thoughtfully, accurately, and with wonderful vividness, and evidently had delight in doing it." From this woman, the wife of a cowherd, who became known as Gammer Grethel, they took down a large number of the stories which within a few short years became known the world over as 'Grimm's Fairy Tales'.

For the first English translation of the tales made by Edgar Taylor, George Cruikshank did a remarkable series of etchings characterized by Ruskin as "unrivalled in masterfulness of touch since Rembrandt (in some qualities of delineation unrivalled even by him)." This edition, called 'German Popular Stories of the Brothers Grimm', published in England in 1823, drew an interesting letter from Sir Walter Scott in which he mentions the similarity of many of the stories to those he had heard as a boy, and adds, "There is also a sort of wild fairy interest in the tales which makes me think them full better adapted to awaken the imagination and soften the heart of childhood than the good-boy stories which have been in later years composed for them. In the latter case their minds

are, as it were, put into the stocks, like their feet at dancing-school, and the moral always consists in good moral conduct being crowned with temporal success. Truth is, I would not give one tear shed over 'Little Red Riding Hood' for all the benefit to be derived from a hundred histories of Jimmy Good-child." This translation, commonly known as the Ruskin Grimm, is still in print, and contains Ruskin's admirable defense of fairy tales, as well as Scott's letter.

Ever since the Grimms produced their book, folklorists have been making similar collections for other countries, and wherever a native imaginative literature could still be found, as in Norway, revealed by the stories of Asbjornsen and Moe, in rural England by Joseph Jacobs, in Ireland by Seumas MacManus and Padraic Colum, in America by Joel Chandler Harris, literature for children has been proportionately enriched by a generous share in the discovery. As geographical boundaries have been extended, folk literature has become increasingly important—giving color and atmosphere to the study of life in different countries.

The Wonder Story

While the Brothers Grimm were still transcribing and accounting for the variants of the old fairy tales which bear their name, a child was born in Denmark who was destined to create not only new fairy tales, but a new form in literature as well.

Hans Christian Andersen put the stamp of originality on his fairy tales. Even the traditional stories of Scandinavia are always retold in his own manner, but the unique achievement of his invention is the wonder story, of which 'The Constant Tin Soldier' and 'The Nightingale' are typical. If Andersen was not the first to give life and personality to inanimate objects, it is he who has shown their independent existence in the most varied application to literature, and it is he who remains the master artist in this special field.

The first book of his 'Wonder Stories', published in 1835, contained only four stories, one of which was 'The Tinder Box'. Mary Howitt made the first translation of the stories into English, and Charles Dickens soon became a warm friend of the storyteller, who has been aptly characterized as the first great child in literature. It was a suggestion made by Dickens in reference to an old Arab proverb that prompted Andersen, some years afterwards, to write a remarkable story, 'The Beetle'.

But it was Thorvaldsen, the Danish sculptor, who begged for a story about a darning-needle, and for him, 'The Darning Needle' was first told. Thorvaldsen would stand laughing and listening to stories like the 'Top and the Ball' and the 'Ugly Duckling' as he worked. 'Ole Luckoie' (the Dream-Man) was composed in his company.

Andersen's autobiography, 'The Story of My Life', is full of similar interesting incidents, of travel, of friendship with kings and queens, actors and

singers, writers and artists of his time; and it also contains notes relating to the stories themselves. The stories were composed at intervals and published a few at a time over a period of nearly 40 years between 1835 and 1872. The first illustrated edition of Andersen's tales appears to have been published in Germany, the work of a Danish artist, V. Pedersen, who was found by Andersen at the request of his German publishers. The same illustrations appeared in the Danish edition of 1849, in an English edition of 1851, and in the author's edition published in America in 1870. Since Pedersen, many artists have sought to give pictorial expression to Andersen's stories. While illustrations may change, these dramas of life in miniature are as fresh in their humor and philosophy, their poetry and pathos, their imaginative charm, as when they were written nearly a hundred years ago.

Poetry and Childhood

It is in William Blake's 'Songs of Innocence', published in 1789, and in Wordsworth's 'Lyrical Ballads', published in 1798, that the beginnings of poetry for children and the first clear recognition of childhood as a distinct element in human life are to be found.

Having once discovered the "new continent of childhood in the spiritual world," poets and story-writers have been in communication with it ever since. Out of their combined efforts there has grown a special literature, prose and poetry alike, created for sheer joy of companionship with children, with birds and animals, earth and sky, sea and mountains and plain, as they appear to children.

This special literature is still a part of the general stream. To it belong Wordsworth's 'Alice Fell' and 'Lucy Gray', 'The Little Black Boy' and 'The Lamb' of William Blake, 'The Fairies' of William Allingham, Mary Howitt's 'Fairies of Caldon Low', Christina Rossetti's 'Sing-Song', Lewis Carroll's 'Alice in Wonderland', Stevenson's 'Child's Garden of Verses', Kipling's 'Road Song of the Bandar-Log' and 'The Seal's Lullaby', Alice Meynell's penetrating glimpses of children, Hilda Conkling's 'Poems of a Little Girl', W. H. Hudson's 'A Little Boy Lost', Walter de la Mare's 'Songs of Childhood', and his unique anthology, 'Come Hither', with its introductory essay and notes, sharing a poet's experience of reading poetry.

Anthologies designed purely to give children and young people a share in a variety of genuine poetry have been in process of making and remaking since the appearance of 'A Golden Treasury of Songs and Lyrics', selected by F. T. Palgrave and published in England in 1861; the 'Children's Garland from the Best Poets' made by Coventry Patmore and published a year later; and 'The Blue Poetry Book', selected by Andrew Lang, with its generous selection from the old ballads.

The 20th century anthology differs markedly from that of the 19th in its liberal inclusion of the

work of living writers, and its frank recognition of the creative intelligence of youthful readers who are making their own discoveries among the poets.

'This Singing World', compiled by Louis Untermeyer and the selection of modern poetry made by Marguerite Wilkinson for Lucy W. Thacher's 'The Listening Child', are good examples of modern anthologies published in the United States and containing a fair proportion of American poetry which children like to read or hear read aloud. 'Rainbow Gold', poems chosen by Sara Teasdale, is an admirable selection with a more limited appeal. 'Golden Numbers', with introduction and interleaves on the reading of poetry by Kate Douglas Wiggin, is one of the best of the standard collections.

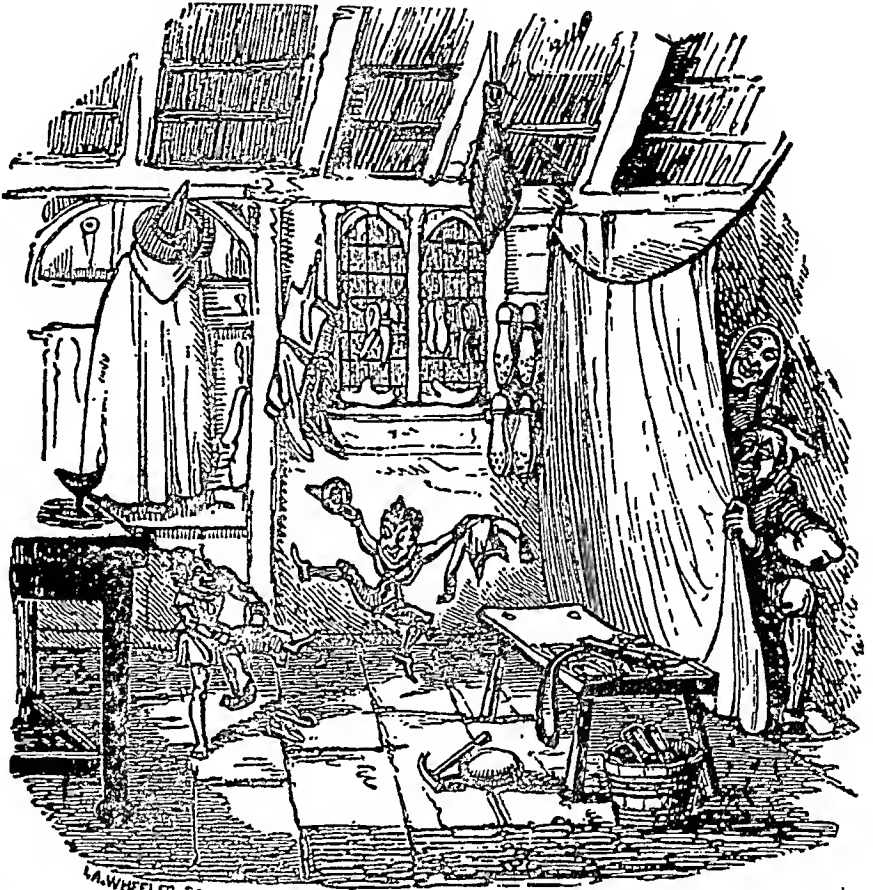
Classics Retold

The first retelling of a classic to achieve a distinctive place in literature for children is 'Tales from Shakespear' by Charles and Mary Lamb. The stories of 20 plays are included in the collection published in 1807 in two small volumes. Charles Lamb wrote the tragedies and Mary the comedies. Godwin, the publisher and proprietor of the copyright, had previously published several of the plays individually in sixpenny books with plates by Blake, "beautifully colored."

The Lambs had very special qualifications for this work. They had intimate acquaintance with the original, and strong feeling for Shakespeare's own words. They were discerning critics. They wrote without condescension, with great simplicity, and with a high regard for the intelligence of children. Among the "things in books' clothing" heartily detested by Charles Lamb were the didactic and moralistic books for children of the time.

Mary Lamb, as revealed by her letters and in 'Mrs. Leicester's School', has a singularly clear and charming style. These stories, autobiographical in form, are told by the children of a girls' school. They embody many childhood memories of the Lambs, and are now more often associated with the literature of childhood than with literature read by children.

'The Adventures of Ulysses', published in 1808, with a "superb frontispiece" by Corbould, was the work of Charles Lamb alone. It is a landmark among classics retold, but it is not as much read today as the 'Tales from Shakespear'. There have been many translations from Homer since then, and the best of



'The Elves and the Shoemaker', one of the famous Cruikshank illustrations made for the first English translation of 'German Popular Stories of the Brothers Grimm'.

them, such as the prose of Lang, Leaf, and Myer, and that of George Herbert Palmer, are now claimed by the older boys and girls, the latter in a sumptuous holiday edition illustrated in color by N. C. Wyeth.

For the younger children, 'The Adventures of Odysseus' by F. S. Marvin, and Padraic Colum's 'Adventures of Odysseus and the Tale of Troy' are excellent renderings in attractive modern form. Mr. Colum has done notable service in the field of retold classics from the Celtic and Norse, as well as from the Greek and from the oriental. A poet, a scholar, and a story-teller, who acquired his first taste for literature orally rather than from the printed page, his stories for children are characterized by directness and a dramatic quality. 'The Forge in the Forest'—his retelling of the old myths of Earth, Air, Fire, and Water—represents an unusual piece of collaboration with a Russian artist, Boris Artzybasheff, who interpreted each story as it was told and before it was written down. This book, published in 1925, set a new standard for modern illustrated books for children.

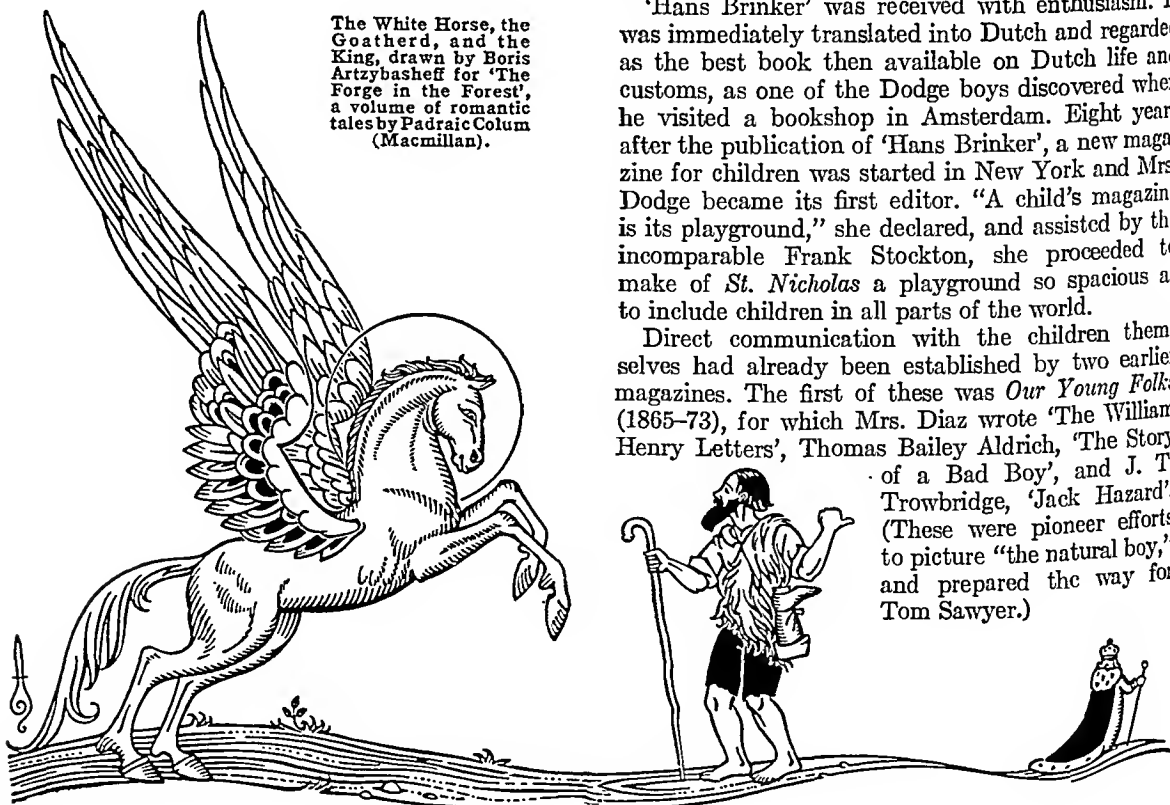
Ever since Hawthorne naturalized the Greek myths for American children in 'The Wonder Book' (1851), for which Walter Crane years afterward came over from England to make exquisite drawings in color, publishers have looked to the field of the retold and abridged classic as the basic source of

supply for children's books worthy of reissue in beautiful form.

There have been many distinguished contributors to this field—Charles Kingsley, William Morris, Sidney Lanier, Sir Arthur Quiller-Couch, Andrew Lang, Ella Young, James Stephens, and Walter de la Mare.

But the one who has exerted the strongest continuous influence, not alone in the field of the retold classic, but also upon the whole modern conception of book making for boys and girls, is Howard Pyle, an American painter of Quaker ancestry. Possessed of the instinct for selection and the power of pictorial imagination to make old tales and romances of chivalry live in new forms, Howard Pyle became the interpreter of a folk inheritance and an art tradition derived from many lands but conceived in the American spirit and attitude toward childhood and boyhood. These books, every one distinctive in design, beginning with 'The Merry Adventures of Robin Hood', a fine prose rendering of the ballads, and leading on to four volumes of King Arthur stories, extended over a period of years from 1883 to 1910. During this period, Howard Pyle was also vivifying the American scene with due regard for pirates and buccaneers. His books are a unique contribution to literature for children. They also afford a fine approach to the work of Dürer, whose influence may be clearly traced in Pyle's drawings (see Dürer).

The White Horse, the Goatherd, and the King, drawn by Boris Artzybasheff for 'The Forge in the Forest', a volume of romantic tales by Padraic Colum (Macmillan).



The Influence of the Novel

The novel has had its place in literature for children ever since 'Robinson Crusoe' appeared (1719), and children have had their place in the novel ever since Charles Dickens and Hawthorne, each in his own way, placed them there. Many a novelist, from Defoe to Stevenson, owes his continued popularity to boy and girl readers, or his place in memory to his power of portraying child character. Living characters and memorable atmosphere are prime qualities in such survivals, and this is true also of fiction written especially for children. Something of the novelist's skill must go into the writing of any good story for children, whether it be a tale of adventure by land, or sea, or air; a story of home or school life; a mystery story, a wonder story, or one with a background of history, or of life in another country.

Mary Mapes Dodge understood this requirement and met it in her story of 'Hans Brinker, or The Silver Skates'. Published in 1865, at the close of the Civil War, this true picture of life in Holland, with its genuine human interest in place of moralizing or preachment, became the touchstone for a new order of fiction for children which is American in origin and very appealing to children of other countries.

Mrs. Dodge first told 'Hans Brinker' to her two boys as a bedtime story when they were 10 and 12 years old. It grew out of her own absorbing interest as a girl in Motley's 'The Rise of the Dutch Republic', and her association with visitors from Holland.

'Hans Brinker' was received with enthusiasm. It was immediately translated into Dutch and regarded as the best book then available on Dutch life and customs, as one of the Dodge boys discovered when he visited a bookshop in Amsterdam. Eight years after the publication of 'Hans Brinker', a new magazine for children was started in New York and Mrs. Dodge became its first editor. "A child's magazine is its playground," she declared, and assisted by the incomparable Frank Stockton, she proceeded to make of *St. Nicholas* a playground so spacious as to include children in all parts of the world.

Direct communication with the children themselves had already been established by two earlier magazines. The first of these was *Our Young Folks* (1865-73), for which Mrs. Diaz wrote 'The William Henry Letters', Thomas Bailey Aldrich, 'The Story of a Bad Boy', and J. T. Trowbridge, 'Jack Hazard'. (These were pioneer efforts to picture "the natural boy," and prepared the way for Tom Sawyer.)

In the *Riverside Magazine* (1867-70), of which Horace E. Scudder was editor, a dozen or more of Hans Christian Andersen's stories had been published before their appearance in Denmark or England. Mr. Scudder, who afterward edited the *Atlantic Monthly*, secured illustrations of unusual quality and variety for the *Riverside*, and established a tradition of well-chosen selections out of world literature which he embodied later in his collection, 'The Children's Book' (1881), and in his essays, 'Childhood in Literature and Art'.

There were other influences also, and Mrs. Dodge was fully alive to them all. In 1868 Louisa Alcott had given the whole world a home story in her 'Little Women'. *St. Nicholas* profited by this event, for Miss Alcott became one of its first contributors. As no writer seemed too distinguished to be asked to write for *St. Nicholas*, no writer with a good story to tell was denied a place there. Kate Douglas Wiggin, young and unknown, had a story accepted, and years after Rebecca of Sunnybrook Farm had taken her place among girl characters, she paid tribute to an editor who understood both writers and children.

Mark Twain's 'The Prince and the Pauper' first appeared in *St. Nicholas* and so did Frances Hodgson Burnett's 'Sara Crewe', and Ruth McEnery Stuart's 'Babette', a story of New Orleans. When Rudyard Kipling inquired if he was not to be asked to contribute, he received this challenging reply, "Are you sure you are equal to it?" Kipling, recalling how he and his sister used to scramble for *St. Nicholas* as boy and girl, retaliated a few weeks later by bringing 'Rikki-Tikki' and 'Toomai of the Elephants' to Mrs. Dodge's home in the Catskills. Thus began the 'Jungle Books'.

In this genial and stimulating atmosphere, creative writing and drawing for children grew and thrived and became a powerful influence in the formation of

that special type of literature for children known as "American stories." Stories ranging from thrilling accounts of Indians and pioneers to tales in which resourceful, adventurous boys and girls took part were bound to seem real because of their truth to life.

The story of the making of books for children and youth is a fascinating one and without an end. There must ever be a selection from the old of what is imperishable, and from the new of that which has the breath of the life of the rising generation. In making this selection the children's library idea has been a significant factor in the development of a special literature for children. Since 1918, children's books have been accorded a definite place in American literary criticism in such leading reviews as the *New York Times Book Review*, *New York Herald Tribune Book Review*, the *Saturday Review*, and the *Horn Book*, a magazine devoted entirely to children's books.

An increasing interest in children's books from foreign countries in both Europe and America was brought to a point by the publication in 1929 and again in 1932 of a list called 'Children's Books and International Good

Will.' Sponsored by The International Bureau of Education in Geneva, it lists the books of 42 countries.

Good Books on Literature for Children

A Critical History of Children's Literature. By Cornelia Meigs, Anne Eaton, Elizabeth Nesbitt and Ruth Hill Viguers. Introduction by H. S. Commager. (Macmillan, 1953.) A comprehensive readable survey of children's books in English and their place in literature from earliest times to 1950. Distinguished format. For the student or for the general reader.

Books, Children and Men. By Paul Hazard. Translated by Marguerite Mitchell. (Horn Book, 1944.) Universal truths of childhood and national traits in literature set forth with wit and wisdom by an eminent French scholar.

The Unreluctant Years: a Critical Approach to Children's Literature. By Lillian H. Smith. (A.L.A., 1953.) A wise, inspiring guide to the selection of children's books. Based on faith in children and in literature. Offers convinc-



'Alice and the White Knight', a picture by Sir John Tenniel for Lewis Carroll's book 'Through the Looking Glass' (Macmillan).

ing evidence that children will read what is provided for them. Excellent critical analyses and bibliographies.

Illustrators of Children's Books, 1744-1945. Compiled by Bertha E. Mahony, Louise P. Latimer, Beulah Folmsbee. (Horn Book, 1947.) A beautiful book containing notable essays about illustrators, the graphic arts, etc. Biographical sketches and complete bibliographies of illustrators.

American Children through Their Books, 1700-1835. By Monica Kiefer. Foreword by Dorothy Canfield Fisher. (Univ. of Pennsylvania Press, 1948.) Fresh, authentic treatment of children's reading in the colonial and early American periods. Presented with humor and knowledge of children.

From Rollo to Tom Sawyer and Other Papers. By Alice M. Jordan. (Horn Book, 1948.) An illuminating and reliable discussion of children's books and magazines published in the United States during the 19th century which includes biographical sketches of the best-known authors of the period.

Reading with Children. By A. T. Eaton (Viking, 1946.) An extremely human and reliable record of long experience in sharing the joys of reading with children of all ages.

The Three Owls Third Book. Written and edited by A. C. Moore. Illustrated. (Coward, 1931.) Contains critical appraisals of children's books (1927-1930). Notes on artists. List of 100 distinctive books of a decade.

Four to Fourteen. A Library of Books for Children. Compiled by Kathleen M. Lines. Introduction by Walter de la Mare. (Cambridge Univ. Press, 1950.) A well-classified and annotated list of books chiefly by English authors.

LITHOGRAPHY. Most printing is done from type or from designs which project above their background, so that they alone receive the ink or touch the paper on which the printing is done. In lithography, however, the printing is done from a smooth surface on which the writing or design is drawn with a greasy substance, or is produced by photography. This latter form of lithography is called photolithography.

This method of printing was invented about 1796 by a Bavarian playwright, Alois Senefelder (1771-1834). It got its name from the Greek words meaning "stone" and "writing," because stone was for long the only satisfactory surface. Today specially prepared plates of zinc or aluminum are often preferred. The design may be made directly on the plate with oily crayons or may be drawn on paper and transferred to the plate by pressure. A mixture of gum arabic and acid is then applied. This fixes the design and cleans all grease from the other parts of the plate, etching them slightly. To print from this plate, water and then a special greasy ink are applied in succession. The water moistens the etched or "empty" parts of the plate but is repelled by the oily design. The ink, on the contrary, clings to the design but is repelled by the remainder of the plate.

By using a separate plate or stone for each color, *chromo lithographs* of colored designs can be made. In *photolithography* the design is photographically reproduced on the sensitized surface of the plate. The *offset* method of printing lithographs consists of impressing the design from the plate to the surface of a rubber-covered cylinder, which in turn transfers it to the paper. This permits printing on many different textures of paper instead of only the smooth paper required for *direct* lithography. (See also Photoengraving and Photolithography; Printing.)

Lithography plays an important part in modern commercial printing, but, like engraving, it is also a

medium for artistic expression. Many very able men turned to it, once it was invented, and many of the best living artists have joined in its 20th-century revival. Adolph Menzel in Germany kept it alive for illustrating books into the late 1860's. In France it was used by Honoré Daumier, notably in his caricatures. Ignace Fantin-Latour produced a famous series of lithographs inspired by Wagner's music. Francisco Goya's grim and brilliant subjects, especially his bullfights, are masterpieces of the art. In England, Samuel Prout did superb lithography. Among Americans, Whistler had an important part in its revival. For posters, particularly war posters, the process has been used by many artists, among whom are Spencer Pryse, Henry Bone, Louis Rae-makers, Joseph Pennell, and George Bellows.

LITHUANIA. From 1918 to 1940 Lithuania was an independent republic. Russian troops occupied it in June 1940; and in August it was proclaimed a constituent republic of the Soviet Union.

Lithuania is the southernmost of the three Baltic states. Unlike Latvia and Estonia, it has only a short coast line on the Baltic Sea. The chief port is Klaipeda (Memel). The capital is Vilnius, also called Vilna or Wilno. The land is a rolling plain, partly covered with forests and marshes, but with much fertile soil. The chief crops are potatoes, rye, barley, oats, wheat, and flax. Industry is little developed, but the peasants are noted for their handicrafts, particularly weaving.

The Lithuanians have lived on the shore of the Baltic since the dawn of history, and they have preserved their early traditions in hundreds of folk songs and folk stories. Their language is an ancient Indo-European tongue. Before the Russian conquest, the majority were Roman Catholics. Primary education was widespread, and higher education was provided in the University of Vilnius and technical colleges.

During the Middle Ages Lithuania rose from a small duchy to the largest state in Europe, spreading from the Baltic to the Black Sea. In 1386 it was joined to Poland by the marriage of the countries' rulers. In the 18th century it was divided between Russia and Prussia through the partition of Poland (see Poland). After the Russian Bolshevik revolution (1917), Lithuania gained its independence. Russia seized the Baltic States following its 1939 pact with Hitler; but Germany occupied them from 1941 to 1944, when they were reconquered by Russia. Russia forced the peasants to merge their farms into "collectives" (state-owned farms). In 1949 the Lithuanian Liberation Committee complained to the United Nations that thousands of farmers had been deported to slave labor camps in Russia and had been replaced by Russians. Area, about 25,200 square miles; population (1947 est.), 2,700,000.

LITMUS. Suppose a chemist wants to know whether a solution is acid or alkaline. He can test it by putting into it a filter paper impregnated with litmus. Acids will turn the paper red. Alkalies, or bases, will turn it blue.

Litmus is a purplish coloring matter made from lichens. The lichens are ground to a pulp with water, mixed with calcium carbonate to form a paste, and then pressed into small cubes. The cubes are used to prepare litmus paper and litmus tincture. Neutral litmus paper is purple. Blue litmus paper has been colored with a few drops of alkali; red, by a few drops of acid. Litmus is manufactured chiefly in the Netherlands.

LITTLE ROCK, ARK. Arkansas' capital and largest city, Little Rock, draws its prosperity from an area rich in farmlands, minerals, and timber. On the farmlands cotton, alfalfa, rice, fruits, vegetables, and livestock are raised. Mineral deposits yield coal, oil, natural gas, marble, granite, and bauxite (aluminum ore). High-grade timber is cut from vast stands of virgin forest.

Little Rock's wholesale houses supply merchandise to a wide area, including neighboring states. Its factories manufacture cottonseed oil, prefabricated houses and other wooden products, electric lamps and motors, roofing materials, watches and clocks, and many other products. The separately incorporated city of North Little Rock, on the opposite bank of the Arkansas River, has large rail workshops.

Little Rock stands on the south bank of the river, near the center of the state. It is set on the edge of the Gulf Coastal Plain; the foothills of the Ozark Mountains lie to the west. The business district spreads back from the river bank. Beyond it, new residential districts are located on rising ground.

The Capitol, completed in 1916, is surrounded by a 12-acre park. The old Capitol, now the War Memorial Building, is close by. The territorial Capitol and a group of early buildings, including a print shop built in 1824 for the *Arkansas Gazette* (still published), are preserved as a memorial. MacArthur Park contains the birthplace of Gen. Douglas MacArthur. Little Rock has the Joseph T. Robinson Memorial Auditorium, state schools for the deaf and blind, and state and federal hospitals. In the city are the medical school of the state university, a law school, a Roman Catholic seminary, and four colleges and junior colleges. North Little Rock has two more.

A large rock on the river bank was called "Little Rock" by an early French explorer to distinguish the site from a high stone bluff two miles farther up the river. Little Rock's first house was built in 1812 by William Lewis. After the site was surveyed for the territorial capital, the government moved from Arkansas Post in 1821 (*see* Arkansas). In early days the town was a colorful and busy river port and frontier post. During the Civil War it was taken by Federal forces in 1863. Little Rock was incorporated as a town in 1831 and chartered a city in 1836. It is the seat of Pulaski County. The city government is the mayor-council form. Population (1950 census), 102,213.

LIVER. In all animals that have a backbone, as well as in some that do not, there is a large gland called the liver, which serves as one of the digestive organs. The liver in man is situated in the abdominal cavity,

on the right side slightly above and behind the stomach. It is the largest gland organ of the body, weighing from three to four pounds. It measures about six or seven inches from front to back, and about twelve inches from right to left.

The liver has four main functions: (1) It produces bile, which aids in the digestion and absorption of fats, and is the vehicle that carries some waste material from the body. (2) Glycogen (or animal starch) is formed from the sugar in the blood and stored away in the liver cells, to be given out again as sugar when it is needed. (3) The liver forms *urea* and other substances. Urea is one of the wastes of the human body, which must be thrown off (*see* Kidneys). (4) The liver also has an important duty in preparing fats for oxidation in the body.

Blood flows into the liver from two main sources. The small hepatic artery brings blood directly from the heart to feed the liver itself; the large portal vein brings all the venous blood from the stomach and intestine to the liver before it goes back to the heart. The liver makes important changes in this blood before it passes on to the general circulation.

Just below the liver is a small pear-shaped sac, known as the gall bladder. This is used as a store-room for the bile. The common bile duct conducts bile to the intestine just beyond the stomach.

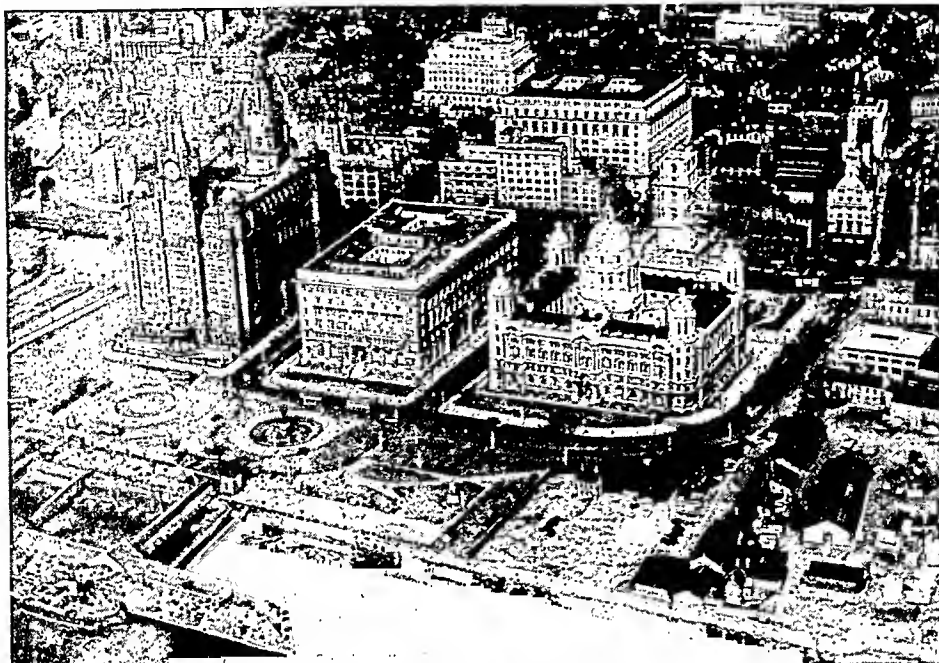
LIVERPOOL, ENGLAND. The "city of ships," Liverpool, is England's greatest ocean port. It lies in Lancashire on the Mersey River, three miles inland from the Irish Sea. It is the natural outlet for the Lancashire industrial region, famous for textiles and machinery. The chief imports are grain, meat, tobacco, and the raw materials for Lancashire industries—cotton, wool, hides, rubber, and timber. The American trade is particularly important, owing to Liverpool's situation on the west coast.

The most interesting sight in Liverpool is the docks. They occupy a river frontage of seven miles, extending northward into the borough of Bootle. The quays are 30 miles in length. Passenger ships dock at a famous landing stage in the river—a floating structure one-half mile long, supported on pontoons. Hinged bridges connect the landing stage with the river wall. The west side of the river is lined with the docks and quays of the busy port of Birkenhead, in Cheshire. The whole system of docks, quays, and warehouses on both sides of the river is public property. It is controlled by the Mersey Docks and Harbor Board, usually called the Liverpool Dock Board.

Liverpool's great port owes little to natural advantages. The Mersey estuary has shifting sand bars across the channel and a tide with a range of 26 feet. To remove the sand the Dock Board keeps a fleet of dredges constantly at work maintaining a 30-foot low-water channel. The advantages of a tideless harbor have been secured by a wonderful system of wet docks operated like the locks of a canal.

Behind the teeming water front, the city stretches in a rough semicircle about nine miles long. The land rises gradually from the river bank. The commercial

PIER HEAD ON LIVERPOOL'S WATER FRONT



The open space is called Pier Head. The buildings facing it are Liver Building (left), Cunard Building (center), and the Dock Board offices (right). On the towers of Liver Building are figures of the "liver," the mythical bird from which Liverpool is said to take its name. In the river can be seen the southern end of the landing stage and some of the bridges that connect it with the river wall.

section of the city has impressive business buildings. In the residential sections are many well-preserved Georgian houses. The University of Liverpool, established in 1903, is noted for its School of Tropical Medicine. The Walker Art Gallery has many famous pictures. The most famous building is St. George's Hall, completed in 1854, which was built after the style of the Parthenon in Athens. Its Great Hall can seat an audience of 2,500, and its concert hall 1,400.

Two great cathedrals have been long in building. The foundation stone of Liverpool Cathedral was laid in 1904, and its central door was opened by Princess Elizabeth in 1949. It is in the new Gothic style. When completed, it will be the largest Anglican church in the country. The Metropolitan Roman Catholic Cathedral, begun in 1933, will rival St. Peter's at Rome in size. It is in the Roman style.

Britain's heavy chemical industry is concentrated in and near Liverpool. The Merseyside region is also

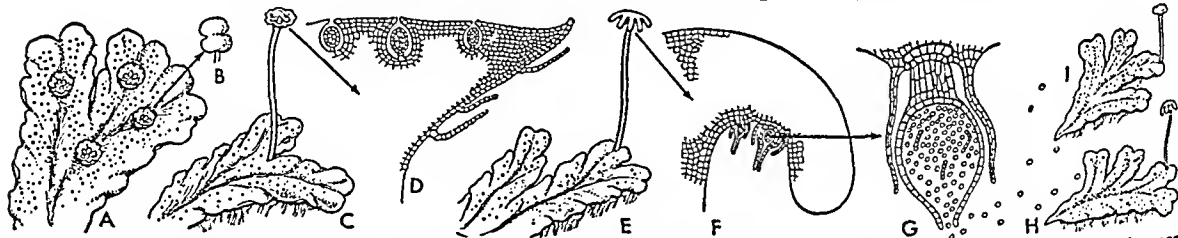
Lancashire the world's greatest cotton-manufacturing center and Liverpool its chief port. Some trade was later diverted through the Manchester Ship Canal. Population (1951 census, preliminary), 789,532.

LIVERWORT. The liverworts look like flat green leaves with rounded lobes. They grow in wet places—on rocks, logs, or damp earth. Their name comes from their shape, which in some varieties looks like that of the human liver. "Wort" comes from an Anglo-Saxon word meaning "plant."

The liverwort is a simple, flowerless plant, one of the first in the earth's history to grow on land. The plant body, called a *thallus*, is not differentiated into leaves, stem, and root. On the under surface are fine white hairs (*rhizoids*). These anchor the plant and absorb food materials. The organs of reproduction are on the upper surface.

Liverworts have three different ways of reproducing. The most common genus, *marchantia*, is a typical

THE LIFE HISTORY OF A LIVERWORT—MARCHANTIA



The plant (A) may bear on its upper surface tiny cups (cups) about an eighth of an inch in diameter. They contain gemmae, or buds. One is shown magnified (B). When a bud falls on moist soil it grows into a new plant. The plant may

also produce umbrella-like stalks which carry sex organs. At the top of one stalk is a disk called the antheridium (C), which contains sperm cells. At the top of another is the archegonium (E), which contains egg cells. Magnified

cross sections of these two disks are shown in D and F. The fertilized egg develops into a spore-bearing body, the sporophyte, shown magnified in G. The ripe spores scatter and develop into new female (H) and male (I) plants.

example. On its upper surface it bears little green cuplike organs called *cupules* (Latin for "little cups"). Within the cups are tiny greenish balls known as *gemmae* (Latin for "twins"), so named because notches at opposite sides make them look like a pair of joined twins. When *gemmae* fall to moist ground, they grow into new plants. This is one form of asexual (without sex) reproduction.

Marchantia may also reproduce by male and female sex organs and by spores (asexual). The sex organs are borne on upright umbrellalike stalks that grow from a notch in the upper side of the thallus. At the top of one stalk is the archegonium, which bears egg cells. At the top of another is the antheridium, which contains sperm cells. The two sexes are borne on different plants. During wet weather the sperms swim to the archegonium of a nearby plant and there fertilize the eggs. A fertilized egg (*zygote*) grows into a spore-bearing plant (*sporophyte*), rooted in the archegonium. The ripe spores are scattered by wind and water. A germinating spore develops into a new thallus, known as the *gametophyte*, from which new sex organs grow. Such a life history, in which a plant producing spores alternates with a plant producing sex cells, is called "alternation of generations" (see Spore).

The liverworts and mosses compose the *Bryophytes*, a division of the plant kingdom; the liverworts form the group *Hepaticae*.

LIVING COSTS. Wage rates of millions of people in free nations today are based largely on the cost of living. When living costs go up, workers receive higher wages to meet the higher prices. When living costs drop, employers tend to cut wages. In the United States some labor unions have an "escalator clause" in their contracts with employers. Under this clause, wages automatically increase when living costs rise and decrease when costs fall.

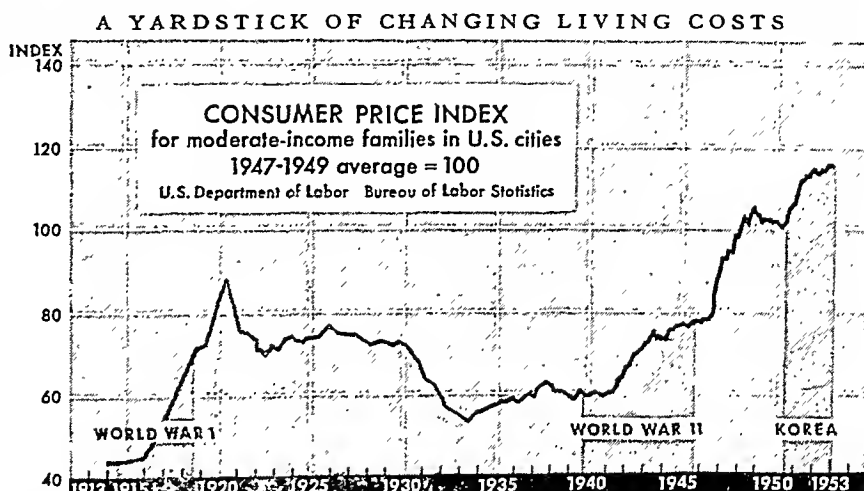
Changes in the cost of living in the United States are shown by a report published by the Bureau of Labor Statistics of the United States Department of Labor. The full name of the report is *Index of Change in Prices of Goods and Services Purchased by City Wage-Earner and Clerical-Worker Families to Maintain Their Level of Living*. It is usually called *Consumer Price Index*, or CPI or BLS (Bureau of Labor Statistics).

In 1950 the Bureau sent out trained investigators to find what goods and services the average urban worker's family buys. They questioned 8,000 families in 97 cities and towns, ranging in size from New York to communities of 2,500 people. At that time the average family income, after taxes, was about \$4,160 a year.

The investigators listed the items and services the families had bought through the year. These included

the kind, quality, amount, and cost of food, clothing, rent or home payment, and utilities. From the hundreds of items and services listed, the Bureau selected 296 as the most representative to be priced. These consisted of 87 foods, 78 articles of clothing, 70 housing items (including rent, home purchase, fuel, utilities, houseware), and 61 other items made up of medical and dental care, personal care, transportation, tobacco, alcoholic beverages, and reading and recreation. The Bureau averaged these family records to make a representative "market basket." For checking prices, the Bureau reduced the number of cities and towns from 97 to 46.

The price of every item in the "market basket" is checked periodically. Trained part-time investigators,



The line numbered 100 at the left is the "base period" (1947-49). The shaded areas show war years. Prices rise in wartime because goods are scarce. They continue to rise when the war ends because government borrowing causes inflation, which weakens the dollar.

often housewives, check food prices every month in each of the 46 towns. Field agents of the Bureau check the remaining items every month in the five largest cities and less frequently in the rest.

The Bureau's statisticians find the average cost of each item. They then multiply the average cost by the quantity shown in the "market basket." This is called *weighting*. A change in food prices (which account for 30 per cent of the average "basket") has three times as much effect on the *Index* as a change in the price of clothing, which accounts for 10 per cent.

The statisticians then figure the *degree* of change in living costs. For a standard of comparison, they use the postwar years 1947-49 as a *base*. The value of the base is 100. If current living costs are 15 per cent above this base, the *index number* is 115. If costs are 5 per cent lower than the base, the *index number* is 95.

The Bureau began the *Index* in 1918. The Bureau has twice revised it in order to include new popular items which reflect changes in people's buying habits. The Bureau set up the present *Index*, which first appeared in 1953, to include such now commonplace items as television, frozen foods, plastics, electric refrigerators, and detergents. Among the foreign governments that compile indexes of living costs are Great Britain, France, and Italy.

The GREAT MISSIONARY EXPLORER of AFRICA

LIVINGSTONE, DAVID (1813-1873). How does it feel to be crunched in the jaws of a lion? Dr. Livingstone, the noted British missionary and African explorer, was one of the few men who knew from personal experience and lived to tell the tale.

Soon after he began his work in South Africa he was sent to establish an advanced station in the heart of the wilderness some 800 miles northeast of Cape-town. The "charming valley" which he and his white companion chose proved to be infested with lions, which attacked the herds by day and leaped into the cattle pens at night. At a distance of 30 yards Dr. Livingstone fired two bullets into one of these ferocious beasts, severely wounding it. Then with a roar it hurled itself upon him, crushing his left shoulder in its jaws, and bearing him to the ground.

"Growling horribly close to my ear," wrote Livingstone, "he shook me as a terrier dog does a rat. The shock produced a stupor similar to that which seems to be felt by a mouse after the first shake of a cat. It caused a sort of dreaminess, in which there was no sense of pain nor feeling of terror, though I was quite conscious of all that was happening."

Fortunately the lion soon left Livingstone to attack his companion and presently fell dead of its wound. Livingstone's shoulder was so badly crushed that it troubled him the rest of his life.

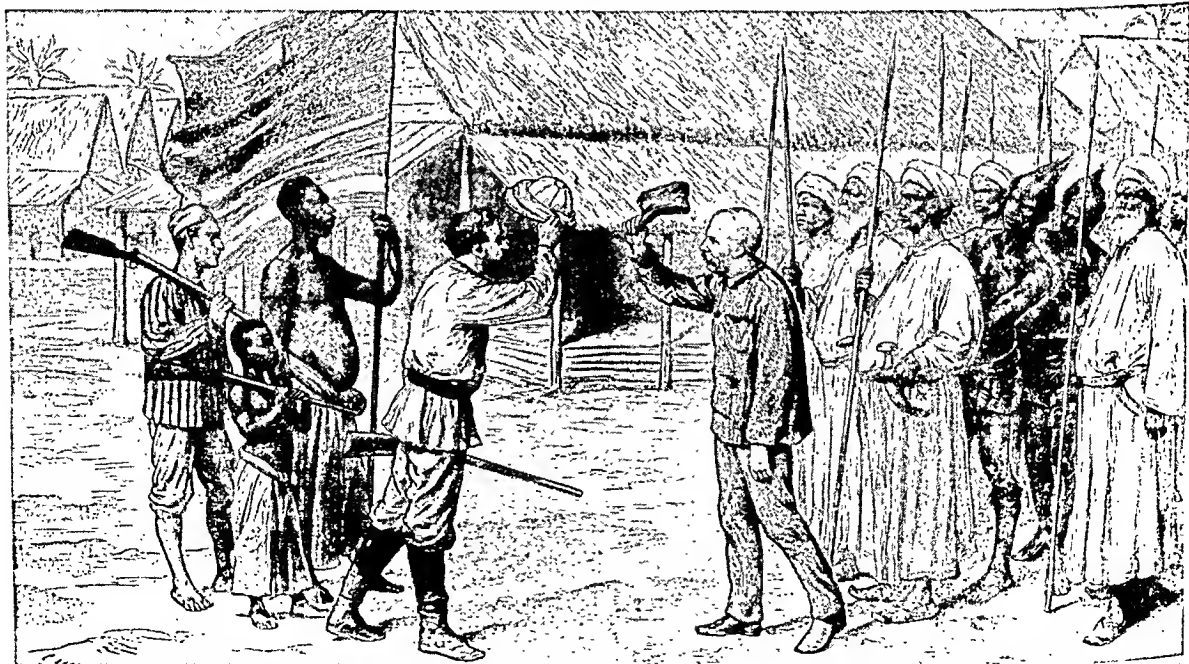
But no dangers of this sort, nor hunger, fever, attacks by hostile Boers or native cannibals, the perfidy of Arab slave traders, nor any of the countless

perils that beset him could dampen his ardor or make him abandon his chosen field. His patient resourcefulness, courage, fair dealing, and Christian character laid the basis for missionary work over a large part of South and Central Africa. In addition, no other explorer ever did so much for African geography as Livingstone during his 30 years' work. He remade a large part of the map of the Dark Continent and laid the foundation for the British title to the districts of Bechuanaland and Rhodesia.

A poor Scottish lad, Livingstone had to go to work in a cotton mill at the age of ten. With the first money that he earned he bought a beginning Latin book. Although work at the factory started at six in the morning and lasted ten hours or more, he attended night school and studied at home until he had read Vergil and Horace. At the factory he kept a book open where he could read a sentence now and then as he went about his work.

In his 20th year he was thrilled by reading an account of a missionary's labors in Asia, and as he says, "resolved to devote my life to the alleviation of human misery." Then followed college classes in Glasgow, examination and acceptance by the London Missionary Society in the great English metropolis, the completion of his medical education, with studies of theology, botany, zoölogy, geology, chemistry, and astronomy—all with a view to his work. At last came his arrival at Algoa Bay in South Africa in 1841 and a 700-mile trip by ox cart to begin his ministry among the natives of Bechuanaland.

MEETING OF LIVINGSTONE AND STANLEY IN CENTRAL AFRICA



Henry Stanley had soarched for eight months through trackless African jungles before he found the missionary-explorer ill and almost destitute in the village of an Arab slave trader. Yet under the hostile eyes of the Arabs, he restrained his joy. "Dr. Livingstone, I presume," was his conventional greeting. This sketch was made for the issue of *Harper's Weekly* dated August 31, 1872.

For over 30 years Dr. Livingstone traveled up and down Africa, from the Cape nearly to the equator and from the Atlantic to the Indian Ocean. He discovered the Victoria Falls of the Zambesi River, Lakes Nyasa and Mweru, and Lake Bangweulu, where he afterward died. He also discovered the upper course of the Congo, called the Lualaba, but he believed it to be the upper Nile. His wife went with him on many of his expeditions. She was the daughter of a missionary and was born in South Africa. His children too were born on that continent.

Livingstone's small salary and the money that he made from his books went to equip new expeditions. Only his iron constitution and his power of inspiring loyalty and affection in the tribesmen enabled him to survive his first years in Africa. During the last 15 years of his life he was aided by the British government, from which he held a roving appointment as consul.

In addition to his missionary work, Livingstone wanted to discover the source of the Nile and to see an end to the Arab slave trade in Africa. He called this trade the "great open sore of the world" and sent home many descriptions of horrible slave raids. In time these reports helped to bring action which ended the trade. Livingstone never found the sources of the Nile, although he died in the attempt.

About a year and a half before he died, an expedition sent by the New York *Herald* under Henry M. Stanley found him at Ujiji on Lake Tanganyika (see Stanley). Livingstone was without many necessities and was weakened by fever. Some of his carriers had deserted with supplies and his precious medicine chest. Stanley tried to persuade him to return to civilization, but he refused.

After the relief party had left, Livingstone again started west, looking for the sources of the Nile. Dysentery, complicated by his weakened condition, attacked him. He grew steadily worse. On the morning of May 1, 1873, his men found him kneeling beside his cot dead. His attendants preserved the body in salt and carried it to Zanzibar. It was taken to England and buried in Westminster Abbey. A monument stands on the spot where he died.

Livingstone's books include 'Missionary Travels and Researches in South Africa' and 'The Zambesi and Its Tributaries'. Both are now out of print.

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The SCALY DRAGONS of MODERN TIMES

LIZARDS. Almost everyone thinks he can recognize a lizard. Yet the 3,000 different kinds in the world differ amazingly in shape, size, color, and habits. There are tiny creatures two or three inches long and giants measuring 12 feet. Most lizards have sturdy legs, with long toes and claws; but some have only front legs, some only back legs, and some no legs at all. They may be green, blue, red, gray, brown, or black. They may live in trees, on the ground, under ground, or in the water. Some dart about with lightning speed. Some glide through the air on "wings" of skin. Some lie sluggish and still.

Lizards may be sleek, slender, and graceful; or they may be fantastically ugly, with grotesque horns, spines, and frilly collars. They have startling habits. They may snap off their tails when they are seized. Some may rear up and run away on their hind legs. Certainly there is nothing commonplace about lizards.

Although there are many superstitions about lizards, only two kinds are poisonous, and most of the others benefit mankind by their preference for insect food.



The land iguana of the Galápagos Islands reminds one of a prehistoric dinosaur. It reaches a length of four feet.

Lizards are reptiles. Together with their close relatives the snakes, they constitute the order *Squamata* of the class *Reptilia*. Many people confuse lizards with salamanders. Like all reptiles, lizards are cold-blooded. They have dry, scaly skin, and claws on their toes. Salamanders are amphibians, related

to frogs and toads. They have smooth, thin, moist skin, and they never have scales or claws. Legless lizards, such as the glass snake, may be mistaken for true snakes. Unlike snakes, however, these lizards have eyelids which they can open and close and ear openings on the sides of the head.

Even more unlike the typical lizards are the worm-like amphisbaenae of tropical America and Africa, known also as worm lizards, blindworms, and blind snakes. They burrow into loose soil and can move backward or forward with equal ease, exactly as an earthworm does by moving the narrow rings which encircle the body. The eyes and ears are hidden under thin growths of skin. The body, however, is marked off into small, scaly squares, and the head is scaly.

Lizards, therefore, may always be distinguished from other animals which they resemble by one or all of four external features—scales, claws, movable eyelids, and ear openings.

Most lizards lay eggs with tough, leathery shells. Some bring forth living young. Some help to incubate the eggs with their bodies, but most of them leave

the eggs to be warmed by the sun, and no care is taken of the young after they have hatched. Lizards are cold-blooded and cannot maintain a constant body temperature. Hence they cannot stand extremes of heat or cold. In temperate climates they hibernate in the winter. In warm climates they bask in the sun for short periods but take shelter during the heat of the day. The smaller lizards feed on worms, insects, and larvae. Some of the large species are plant eaters, and some eat other lizards and their own young.

Some American Lizards

Warmer portions of the earth have the greatest number and variety of lizards, but they are also found in temperate latitudes. There are about 125 different kinds in the United States. One of the most familiar is the little chameleon, also called anolis. It belongs to the iguana family, *Iguanidae*, and is quite different from the true chameleon family of Africa. Both families are interesting for their ability to change color (see Chameleon). The chameleons' large, powerful relatives, the iguanas, dwell in the jungles of Mexico, Central and South America, the West Indies, and the Galápagos Islands (see Iguana).

The fence lizard, also known as the common swift, is abundant in the eastern United States in dry pine woods from New Jersey southward. It is brown or gray, with rough, barklike scales that blend perfectly with stones, logs, and the bark of trees. The males have blue patches on the sides and on the throat. The usual length is about five inches.

Skinks and Race Runners

The skinks are slender, snakelike animals, but with well-developed legs on which they run swiftly. They have smooth, glassy scales. Most of them have light stripes against a brown or black background. Most widely distributed, from Texas eastward through the central and southern states, is the five-lined skink.

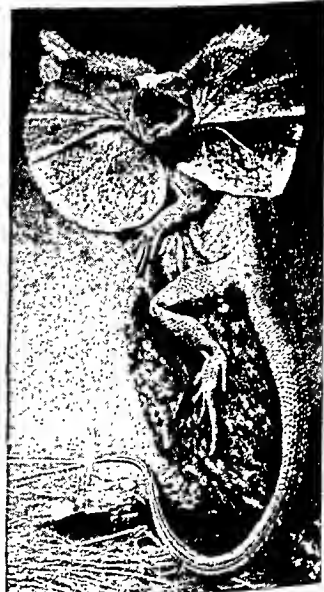
LIZARDS—ALL SIZES AND SHAPES



The common lizard of northern and central Europe is a graceful, quick little creature, only six or seven inches long. It is found in hedges, gardens, and woodlands everywhere.



The dragon lizard of Komodo (left), in the East Indies, is the largest of all. It is twelve feet long and weighs 250 pounds.



The Australian frilled lizard (right) is three feet long. That great collar stands up when the animal is angry or frightened.

The young have blue tails and five yellowish stripes on a black background. As they grow older their tails become gray, the heads reddish, and the bodies a uniform olive-brown. They grow to be about $7\frac{1}{2}$ inches long. These skinks usually live in woods. They are almost impossible to catch. The glassy scales and quick movements make them difficult to grasp, and the tails break off with only a pinch. While the tail wriggles furiously and distracts the attention of the "enemy," the skink makes a hasty escape. Skinks are called scorpions in some regions, probably because they can bite and pinch painfully. They are in no way related to true scorpions.

The six-lined race runner lives in open sandy places in the Southern states. It may be recognized by the tiny scales and six stripes down the back. It grows to be nine inches long.

The glass snake of the southeastern and south-central United States has no legs except two tiny spikes at the rear of the body. Over half its length of nearly two feet consists of tail. The tail is extremely brittle and the highly polished scales make the animal appear truly glassy. The popular belief that a glass snake will try to seek its lost tail and rejoin the broken pieces is untrue. It soon grows a new tail, however, to replace the missing member.

Lizards of the Western Deserts

In the Western states and Mexico are several different kinds of swifts closely related to the eastern fence lizard. Some have coarse, spiny-tipped scales.

Only two species of lizards are poisonous. These are the Gila monster of Arizona and Mexico, and its cousin, the horrid heloderm of Mexico and Central America. Each has a fat, sluggish body, about two feet long. The short tail is a storage reservoir of fat on which the animal can live for months if it is

deprived of food. The Gila monster is pink or orange, marked with black. The surface of the body is warty or beady, and the effect combined with the gaudy color and pattern looks like Indian beadwork. The horrid heloderm is yellow and black.

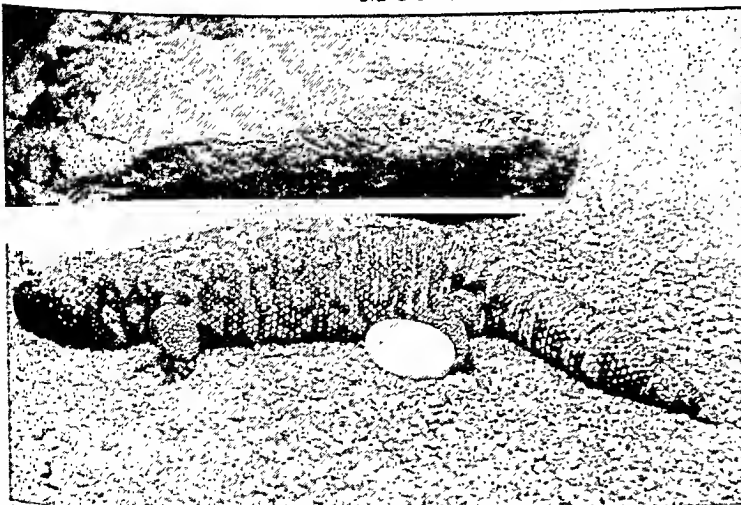
The Gila monster moves in a sprawling manner, dragging its chunky body on the ground. When it is angry it leaps and twists in a flash, snapping its fangs into the attacker. It keeps a bulldog grip for as long as ten minutes, chewing with its grooved teeth and working the poison into the wound. The poison sacs lie in the base of the mouth. Small animals die quickly when bitten by the vicious creature, and it is extremely dangerous to man. It feeds chiefly on the eggs of snakes and other lizards.

The horned toad, so called because of its flat, toadlike body, dwells throughout the dry plains and deserts of western America. It is covered with short sharp spines, particularly about the head, which protect it from being swallowed by snakes. (For a picture, see Protective Coloration.) New Mexico forbids the killing of this lizard because of its value in destroying insects. The chuckwalla, or chuckawalla, is a plant-eating lizard highly esteemed as a food by the Indians. It lives on tender leaves and flowers.

The collared lizard ranges from Kansas to Arizona. It is one of the handsomest and most amusing of the lizards. The male in the breeding season is green, dotted with yellow spots. It has a black collar, an orange throat, and red spots on the hind legs. The female is slaty gray, but just before the eggs are laid its sides turn brick red. These lizards hop and jump nimbly over the rocky places where they prefer to live, and they run on their long hind legs.

Geckos are an interesting group that break most of the rules for lizard appearance and behavior. Al-

"MONSTERS" AND "DRAGONS"



The Gila monster of the southwestern United States (shown above) and its cousin the horrid heloderm are the only poisonous lizards in the world. This creature, lying beside its egg, looks like Indian beadwork in a gaudy pattern of pink and black. The little flying dragon of Malaya (at the right) has "wings" of skin. The under sides are colored a brilliant orange or yellow with blotches of black. Thus by means of protective coloration the lizard conceals itself among the brilliant flowers of the jungle treetops where it lives and feeds.

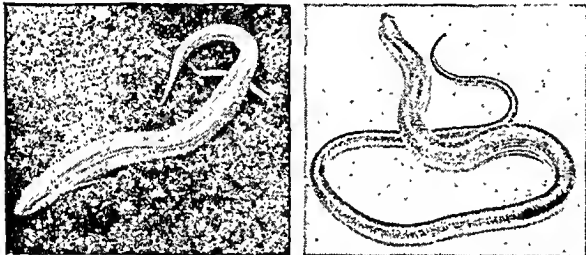


though lizards usually have no voice beyond an angry hiss, the gecko produces a variety of clicking sounds, from which the name is derived. One kind looks like a toad. On each toe of the widespread feet are suction disks by which it can scamper over walls, ceiling, and windows in pursuit of insects. It often enters dwellings at night. It has catlike eyes, with elliptical pupils, typical of night-roaming animals. This gecko lives in trees. Another kind dwells in deserts. It has a lighter, more slender body, and the suckers on the toes are replaced with a fringe of scales which prevent the feet from sinking into the sand. Geckos are very useful, for they destroy many insects. These harmless little creatures are objects of superstitious dread in many parts of the world. It is believed that they spread mysterious poisons.

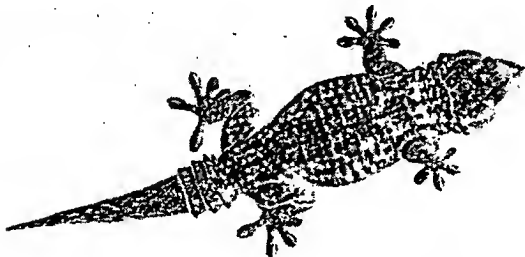
"Dragons" of Faraway Lands

The nearest thing to flying found among the lizards are the sailing leaps from tree to tree performed by the small "flying dragons" of Malaya. The "wings" are thin membranes of skin stretched over an outward extension of the ribs. They support the lizard like a

SKINK, "SNAKE," SWIFT, AND GECKO



The sand skink (left) of the Sahara and Arabian deserts and the American glass snake (right) are both snakelike lizards.



The little gecko has suction disks on the ends of its toes by which it can climb smooth surfaces or walk upside down.



The collared swift of Mexico has coarsely overlapping, spine-tipped scales and a broad, scaly collar.

parachute as it glides through the air. The under side is brightly colored and so helps to conceal the animal as it lies among the colorful flowers in the jungle treetops (protective coloration).

The frilled lizard of Australia runs swiftly for great distances on its hind legs. The front legs swing back and forth like the arms of a human runner, and the tail projects stiffly backward and upward to balance the sprinter, making it look like a strange bird. The "frill" is a broad collar of loose skin around the neck. It spreads out like an umbrella when the animal is frightened or angry. At the same time it opens its mouth wide and hisses venomously—all of which is pure bluff. Such tricks are common among lizards. The hooded basilisk of Central America, named after the fabled monster that was supposed to strike men dead with its glance, is a good example of such "frightfulness." It is about three feet long and has jagged crests which it can raise at will on its head, back, and tail. It is quite harmless.

Not all lizards depend on "frightfulness" or flight to defend themselves. Some are fierce fighters and biters. This is particularly true of the monitor family, whose members are scattered through Africa, Arabia, southern Asia, and Australia. The largest lizard of all is the dragon lizard of Komodo (in the East Indies), which reaches a length of 12 feet and may weigh 250 pounds. Like all the monitors, it has a long whiplike tail with which it lashes and cuts its assailants when it is unable to reach them with its sharp and powerful teeth. It is one of the few lizards that feeds on small mammals.

Lizards As Pets

Lizards make attractive pets. They should be kept in a terrarium with dry soil, sand, or moss on the bottom. (For instructions on how to make a desert terrarium, see *Nature Study*.) Lizards need direct sunlight for a part of the day, but they must have a place to seek shade if they become too warm. A hiding place should be provided in a corner, made of plants, stones, or bits of wood.

Most lizards should be fed insects. Meal worms and roaches, flies, crickets, and grasshoppers are relished. Some will learn to eat raw ground beef and eggs. As a rule they will not drink from a pan. Water must be generously sprinkled on leaves, stones, and other objects so that they can lick up the drops. Since their habits vary, it is wise to study carefully the exact species that you propose to cage.

Scientific Classification

Lizards belong to the suborder *Lacertilia*. It is divided into many different families: *Gekkonidae*, the geckos; *Agamidae*, frilled lizard and flying dragon; *Iguanidae*, iguanas, anolis or American chameleon, basilisk, chuckwalla, collared lizard, swift, horned toad; *Anguillidae*, glass snake; *Helodermatidae*, Gila monster and horrid heloderm; *Varanidae*, monitor lizard; *Teiidae*, race runner; *Amphisbaenidae*, worm lizard, or blind snake; *Lacertidae*, European common lizard; *Scincidae*, skink; *Chamaeleontidae*, African chameleon.

LLAMA (*lä'mä*). The Americas have no camels, but South America has a close relative. It is the hissing, spitting llama of the Andes. The llama does not have a hump like a camel, and a grown one is only about three feet high at the shoulder. But it has the camel's peculiar teeth and bone structure, the same kind of cloven, padded hoofs, and a water-storing stomach.

When the Spaniards conquered Peru in the 16th century, they found the Incas using llamas as beasts of burden. Earlier Indians had domesticated them from the guanaco, an animal which still lives wild in remote parts of the Andes. In all the New World llamas and dogs were the only domesticated animals.

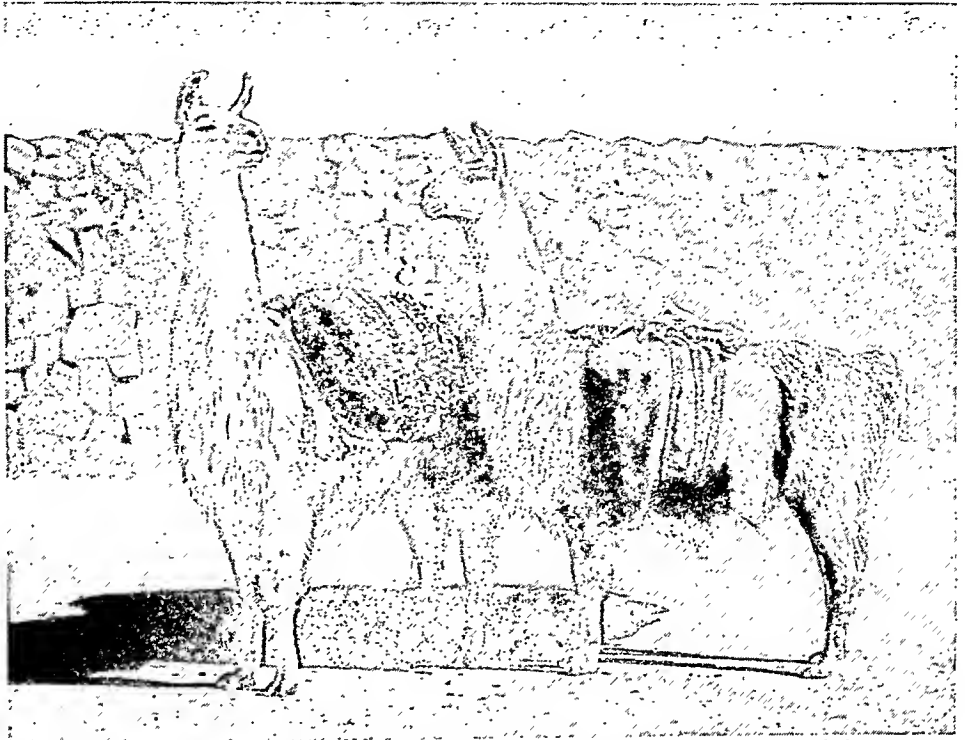
The Spanish conquerors continued to use llamas with native drivers, particularly to carry silver over the narrow mountain trails from the mines to the coast. Until the middle of the 19th century, no other means of transportation was developed in the rugged, mountainous regions of the South American continent.

Llamas can carry 120 pounds at the leisurely rate of 12 miles a day. If they are overloaded, they lie down and refuse to move. If treated well, llamas are willing and docile. They eat the coarse plants they find growing along the way. They can stand the cold of high altitudes and can travel over places too rough and steep for any other burden-bearing animal. When disturbed, they spit a ball of food and saliva at their tormentor.

Llama wool is not valuable, like the wool of its near relatives, the alpaca and vicuña. Llama wool is coarse and rough and is suitable only for twine and very coarse cloth. Usually it is brown, with shades or speckles of yellow and black. Occasionally a llama will be pure white or pure black.

The male llama is chiefly valued as a beast of burden. The females are useful for their milk and meat, which resembles mutton. They bear single young once a year. Scientific name of the llama, *Lama glama*. **LLOYD GEORGE, DAVID** (1863-1945). At the age of 17, a small slender Welshman visited the British House of Commons, and afterward recorded in his diary his hope for a political career. The young

THE CAMEL'S MOUNTAIN COUSIN



The llama of the Andes is a small relative of the camel. Like its Old World cousin, it has a mean and ugly disposition, but it is the best beast of burden for its homeland.

Welshman was David Lloyd George. In time he became the prime minister who guided Britain to victory over Germany in the first World War.

Most of Lloyd George's life was a struggle. He was born in Manchester where his Welsh father, William George, had gone to teach school. Soon after David's birth his father's health failed, and the family returned to Wales. The father died two years later. David was educated in the village of Llanystumdwy by his uncle, Richard Lloyd, the village cobbler. In his honor the boy took the name Lloyd.

At the age of 14 he began to study law and at 21 was admitted to practise as a solicitor. In 1890 he was elected to Parliament as a Liberal from the Welsh district of Carnarvon. "The great little Welshman" held his seat in Commons for more than 50 years. At no time could public opinion turn him from what he thought was just. He denounced the British campaign in the Boer War (1899) as an act of aggression against a struggling young republic. Crowds in Birmingham mobbed him.

In 1905 he accepted a minor office in the cabinet as head of the Board of Trade. There he put through a shipping act to aid seamen and settled a critical railway strike. His power to combine conciliation with aggressiveness marked the rest of his political life.

He advanced to the second highest cabinet post in 1908 when he became chancellor of the exchequer, with Herbert Asquith as prime minister. As manager of

LLOYD GEORGE



This aggressive Welshman led Britain in the first World War.

British finances, Lloyd George determined to ease the tax burden on the poor. He also planned an Old Age Pension Act. To provide funds for it, he drew up a national budget that put new taxes on the wealthy. These threatened to break up the old landed estates, and his political foes called the act a "revolution."

The conservative House of Lords rejected Lloyd George's budget. But a general election showed that the mass of British people favored it. So strong was public support that in 1911 an act of Parliament abolished the power of the House of Lords to reject a money bill, such as the budget. Lloyd George at once launched a more extended program of social reform. Under his leadership laws were passed to give workers cheap insurance against sickness and unemployment, free medical service, and maternity benefits.

When World War I broke out in 1914, many people expected him to resign, as he had long been regarded as a pacifist. The moment Germany invaded Belgium, however, he denounced the aggression. He was put in charge of the new Ministry of Munitions in 1915 and filled this position with brilliant success. In 1916 he became head of the war office.

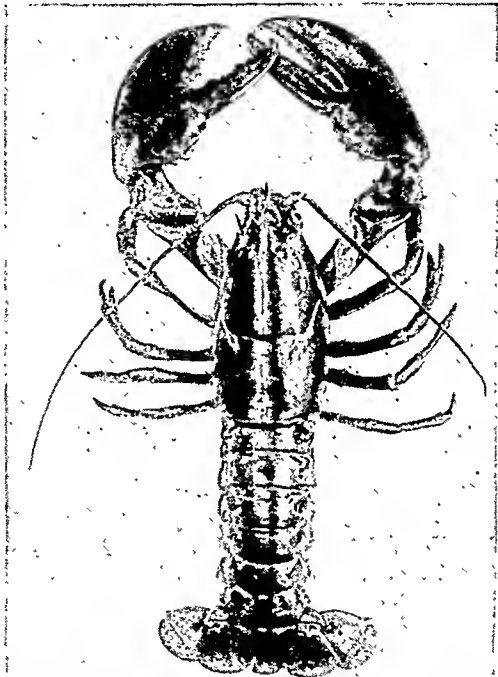
The Liberal party at this time was divided. In December 1916 Lloyd George forced Asquith's resignation and became prime minister as head of a coalition of Conservatives and Lloyd George Liberals. Before going to Versailles as peace delegate, he strengthened his position by winning the "khaki election" of November 1918. At the peace conference he seemed uncertain. Sometimes he sided with France's efforts to destroy Germany. At other times he aided President Wilson's efforts for a peace based on reconciliation and the rights of nationalities.

After 1919 Lloyd George's leadership weakened, largely as a result of a slump in business that brought on strikes and unemployment. In 1922 the Conservatives withdrew from the coalition and Lloyd George at once resigned. He remained in the Commons for the rest of his life, but the influence of the divided Liberal party grew weaker and weaker. His last great effort to return to office came in the general election of 1929, when he made glittering promises to "conquer unemployment." The voters were not impressed and returned the rising Labor party instead. Lloyd George's later years were given to the writing of his 'War Memoirs'. In 1944 he was made first Earl Lloyd George of Dwyfor. He died just as World War II was coming to an end. (See also English History.)

LOBSTER. At the bottom of shallow waters along many of the world's sea coasts, some kind of lobsters may be found. They are big cousins of the common crawfishes and are more distantly related to shrimps and crabs. Like all crustaceans, they have tough shells and breathe through gills.

The American lobster (*Homarus americanus*) lives along the Atlantic coast all the way from North Carolina to Labrador. In warm weather it stays near shore where the water is from 60 to 100 feet deep. With the approach of cold weather it usually moves out to depths of more than 200 feet.

A LOBSTER SHOWS HOW IT EATS



The antennae help locate food. The smaller claw seizes and cuts food. The heavier (club) claw at the left is used for crushing

Most of the lobsters caught by fishermen weigh less than two pounds, but giant specimens are sometimes taken. They are colored blue-green, spotted with green-black, and the pincers are marked with orange. These colors come from pigments in the blood and in the thin skin. The shell itself is colorless. It is made of the same substance (chitin) as the outer covering of insects, but it is stiffened with calcium salts.

This shell completely covers body and limbs but is jointed in many places to allow freedom of movement. A single expanse called the *carapace* covers the head and thorax. Six overlapping rings enclose the abdomen. To the sixth ring is joined a fanshaped tailpiece, which serves as rudder and oar. Walking along the sea bottom, the lobster moves forward, but its fastest motion is in reverse. A single flip of its tail may drive it 25 feet backward.

The lobster's head bears a pair of large compound eyes, set on freely moving stalks, and two pairs of antennae. On the underside of the head lies the mouth. Food is chewed by toothed appendages set around the opening near by.

From the thorax extend five pairs of legs. Each of the first pair has a pincerlike claw. One of these—either right or left—grows larger than the other. It is called the club claw and is used for crushing. The smaller claw (quick claw), set with sharp teeth, is used for seizing and tearing prey. The lobster's other legs are used for walking. From the abdomen dangle five pairs of fringed paddles, the swimmerets.

Why the Lobster Feels at Home in the Deep

The lobster is well equipped for life in the ocean. It has 20 pairs of gills to extract from water the oxygen it needs. Antennae, body, and limbs are covered with thousands of sensory hairs that inform the lobster of food and enemies which its eyes fail to detect. Some of these hairs combine the senses of taste and smell.

By day the lobster lurks in its burrow in the bottom of the sea. At night it goes hunting. Carrying its claws directly forward, it whips the water with its small antennae and with its large ones probes every crevice. Suddenly the small claw seizes a fish, snail, sea urchin, starfish, or a bit of seaweed. Or the keen antennae may detect a clam buried deep in the sand, and the large claw digs it out and crushes its shell. Then the small claw passes bits of the flesh along to the mouth.

Soon the lobster grows too big for its shell and must get rid of it. The shell splits across the back and the lobster draws himself out of it, shedding not only the shell and its hairs, but also the lining of mouth, throat, and forestomach. For three weeks after molting, until its skin hardens into a new shell, the lobster is weak and helpless. It may then be eaten by one of its many enemies, especially the codfish, skate, and dogfish. Adult males often have two new suits a year; the females, only one. If a lobster happens to break off a limb, the bud of a new one begins to form at once. After a few molts, the new limb can hardly be told from the old.

How Lobsters Multiply

Lobsters spawn in spring or summer (June in the South, September in the North). The female produces from 3,000 to more than 70,000 eggs, according to her size and age, and secretes a glue which fastens them to her swimmerets. In this state she is called a "berry lobster." She carries her eggs for 10 or 11 months, flexing her tail to enclose them in a kind of pocket when eels and other hungry enemies draw near. During the hatching period of about seven nights, she agitates her tail and disperses the young (larvae) in clouds as they emerge from the eggs. Not until spring or summer of the following year will the female spawn again. Thus the spawning periods are two years apart.

The new larvae are only one third of an inch long, with big green eyes. They lack swimmerets and paddle along the surface with hair-fringed legs, snapping up drifting food particles. Many are eaten by herring, menhaden, and other fishes. The larvae molt three times in their first 15 to 18 days. By this time they are one-half inch long and resemble small adults. When they are a year old, they are two to three inches long and have molted from 14 to 17 times. They mature when they are three to five years old.

Catching Lobsters for the Market

American lobsters seldom grow old, for they have been a favorite article of food ever since the Pilgrims

THIS LOBSTER WAS CAUGHT WHILE DINING.



The man is taking a lobster from the trap, or "lobster pot," in which it was caught at the bottom of the sea. Through the pot's funnel of netting the lobster hurried right in for a fish dinner, but it did not know how to leave by the same hole it entered.

first tasted them. To capture them, a slatted box called a "lobster pot" with a funnel-shaped opening of coarse net at one end is baited with fish, weighted with a flat stone, and sunk to the bottom on a quarter-inch line. On the other end of the line is a buoy which carries the lobsterman's private mark, name, and license number. The lobster finds it easy to enter the pot, for the funnel points invitingly inward, but it is not bright enough to find its way out. In good weather, the lobsterman visits his pots once a day to remove the lobsters and replenish the bait.

The chief lobster fisheries of the United States lie along the coast of Maine. From Maine north to Gaspé, Quebec, extend the principal lobster fisheries of Canada, which are the greatest in the world. To keep the lobsters from being exterminated, spawning females are protected, and lobsters below a minimum size may not be caught. In Maine there is also a maximum size limit to protect large spawners. The United States catch is marketed fresh. In Can-

ada a portion of the production is canned. The claws furnish the tenderest meat. When the lobster is cooked, its shell turns a brilliant red.

The lobster belongs to the family *Homaridae* of the crustaceans. The family includes the European lob-

CARGO OF EGGS



A female lobster carries her eggs glued to the swimmerets that hang from the underside of her abdomen. The eggs remain attached 10 to 11 months.

ster (*Homarus gammarus*) and the small Norway lobster (*Nephrops norvegicus*). Both species inhabit Europe's coastal waters from Norway to the Mediterranean.

In the warmer seas of the world live the *spiny lobsters* (family *Palinuridae*). They lack the large pincers of the true lobsters, but have sharp spines on body armor and antennae. Many species compare with the American lobster in size and flavor. Among these are the sea crawfish (*Palinurus*, or *Panulirus*, *argus*), along the Atlantic coast from North Carolina to Florida. The California spiny lobster (*P. interruptus*) is found along the Pacific coast from Point Conception, Calif., to Mexico.

LOCKE, ALAIN LE ROY (1886-1954). As a writer and teacher, Alain Locke was one of the first to tell Americans how much his fellow Negroes have contributed to music, art, and literature. He has been equally influential in encouraging other Negroes to add their accomplishments to the record.

Locke was born in Philadelphia, Pa. Both his parents were schoolteachers. They wanted their son to enter one of the professions, perhaps medicine, as a means of rising above some of the restrictions placed upon his race. But sickness made a career as a doctor impossible, and the parents helped young Locke to prepare himself as a teacher.

After graduating from the Philadelphia School of Pedagogy in 1904, he entered Harvard University. There he studied under such great teachers as Barrett Wendell and Charles T. Copeland. His major study, philosophy, also brought him under the influence of Josiah Royce, William James, and George Santayana.

Locke won a Rhodes scholarship after graduation from Harvard in 1907. He studied in England at Oxford University for the next three years. After another year at the University of Berlin, he returned home in 1912. He began teaching at Howard University in Washington, D.C.

His books stressed Negro culture, but he always tried to show how this fitted into the whole of American life. His first book was 'The New Negro' (1925). He acted either as author or editor for a number of others. Among these were 'The Negro in America' (1933), 'The Negro and His Music' (1936), and 'The Negro in Art' (1941), a picture book of Negro art and Negroes as subjects for other artists. With Bernhard J. Stern he edited 'When Peoples Meet; a Study in Race and Culture Contacts' (1942).

LOCKE, JOHN (1632-1704). One of the pioneers in modern thinking was the English philosopher, John Locke. He lived at the same time as Isaac Newton, the genius who did most to establish modern physics. Like Newton, Locke believed in using reason and the test of experiment or experience to discover truth, rather than accepting the views of earlier authorities. But Locke made his great contributions in studies of politics, government, and psychology.

John Locke was the son of another John Locke, a well-to-do Puritan lawyer who fought for Cromwell in the English Civil War. The father was a devout,

even-tempered man, and the boy was devoted to him. There is a story that the elder Locke once struck young John in anger, and the act weighed on him for many years. Long afterward, when John had grown to manhood, his father reminded him of the incident and asked his forgiveness.

The boy was educated at Westminster School and Oxford, and later became a tutor at the university. His friends urged him to enter the Church of England, but he decided that he was not fitted for the calling. He had long been interested in meteorology and the experimental sciences, especially chemistry. He turned to medicine and by adopting new methods of treat-

ment he became one of the most skilled practitioners of his day.

In 1667 Locke became confidential secretary and personal physician to Anthony Ashley Cooper, later lord chancellor and first Earl of Shaftsbury. Locke's association with Shaftsbury enabled him to meet many of the great men of England, but it also caused him a great

deal of trouble. Shaftsbury was indicted for high treason and imprisoned in the Tower. Although Shaftsbury was acquitted, Locke was suspected of disloyalty. In 1683 he left England for Holland, and returned only after the revolution of 1688.

Teachings about Government and Psychology

Locke is remembered today largely as a political philosopher. He preached the doctrine that men naturally possess certain large rights, the chief being life, liberty, and property. Rulers, he said, derived their power only from the consent of the people. He thought that government should be like a contract between the rulers and his subjects. The people give up certain of their rights in return for just rule. And the ruler should hold his power only so long as he uses it justly. These ideas had a tremendous effect on all future political thinking. The American Declaration of Independence clearly reflects Locke's teachings.

Locke was always much interested in psychology. About 1670, friends urged him to write a paper on the limitations of human judgment. He started to write a few paragraphs, but 20 years passed before he finished. The result was his great and famous 'Essay Concerning Human Understanding'. In this work he stressed the theory that the human mind starts as a *tabula rasa* (smoothed tablet)—that is, a waxed tablet ready to be used for writing. The mind has no inborn ideas, as most men of the time believed. Throughout life it forms its ideas only from impressions (sense experiences) which are made upon its surface. Because he stressed the rôle of experience, Locke is called the "father of English Empiricism."

JOHN LOCKE



His ideas are reflected in the Declaration of Independence.

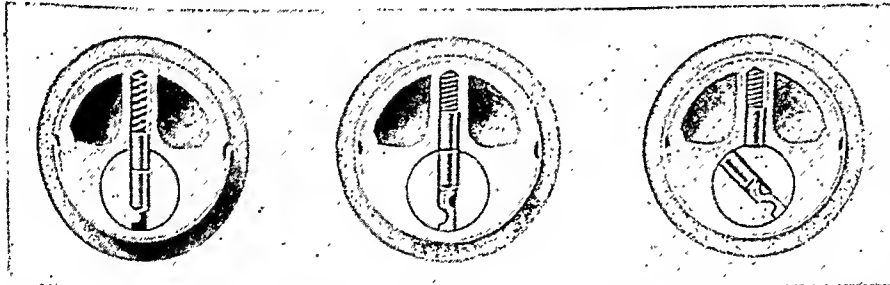
In discussing education, Locke urged the view that character formation is far more important than information and that learning should be pleasant. In later years, he turned more and more to writing about religion. He favored simplicity and considered primitive Christianity as the best of all forms of religion. It may seem strange in modern times, that Locke favored outlawing atheists and Catholics in England. But in his day, England was engaged in one of the bitterest religious controversies in its history. For his day, Locke was very tolerant in matters of religion.

Locke's principal works are letters 'On Toleration', 1689, 1690, 1692; 'An Essay Concerning Human Understanding', 1690; two treatises 'On Civil Government', 1690; 'Thoughts on Education', 1693; and 'The Reasonableness of Christianity', 1695.

LOCKS AND KEYS. Keys a foot long and weighing as much as a pound were common in the Middle Ages. The warden of a dungeon or a castle carried at his belt a collection of keys which could be used as a club if necessary. Yet the great locks which were opened by those giant keys were not as secure as the small modern locks fitted with keys that tuck away snugly in a vest pocket.

The locks of today may be divided into two general classes—warded locks and tumbler, or lever, locks.

HOW A CYLINDER LOCK WORKS



In the first picture we see a cross-section of the inside of the lock, showing how the smaller cylinder, which fits within the larger cylinder, is kept from revolving by a pin tumbler. The tumbler is thrust down by a tiny coiled spring. This pin tumbler is cut in two near the middle. In the next picture we see what happens when the key is inserted in the lock—the pin tumbler is raised until the "cut" comes at the junction point of the two cylinders. This permits the inner cylinder to revolve, as shown in the third picture.

Warded locks are simpler and usually cheaper than the other type. They are also less secure. One variety is used for the interior doors of houses—closet and bedroom doors, for example. A lighter variety is used in drawers of various sorts. Tumbler locks are commonly used for outside doors. The most familiar variety is the Yale type of lock shown in the adjoining picture.

A warded lock has a number of projections on the inside called *wards*. The key to such a lock is often shaped like a flag on a staff. The flaglike part, called the *bit* or *web*, is cut away in a pattern corresponding to the wards of the lock. When the key is turned in the lock, the bit passes by the wards and moves the bolt which secures the door.

Only the key intended for the particular lock—or a skeleton key—will turn past the wards. A skeleton key has most of the bit cut away. Only enough remains to move the bolt.

The tumbler lock represents an improvement over the warded lock. It was probably invented by the Chinese, though its fundamental principle was used in an ancient Egyptian lock. Instead of fixed wards, this type of lock has small movable levers or pegs called *tumblers*. The lock can be opened only by a key whose *bitting* (a series of notches) will raise each tumbler to exactly the proper height.

It was not until the latter part of the 18th century that these locks were substantially improved. The English Bramah lock then came into use. It consisted of a number of sliding tumblers contained in a tube or cylinder projecting from the lock. The construction made it more secure and harder to pick than other locks.

The Bramah lock, in turn, was improved by the American inventor Linus Yale, Jr. (1821-68). He perfected the pin tumbler or cylinder lock universally known today as the Yale lock. It is a cylinder within a cylinder. It opens with a flat key and cannot be opened by any key differing from the true key by

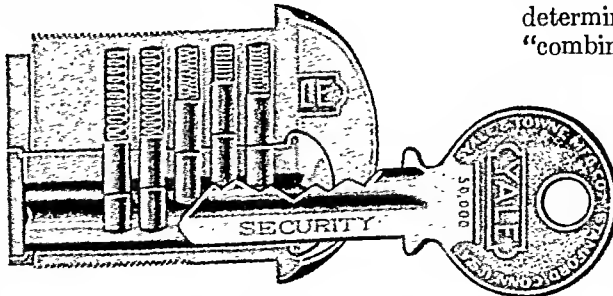
even so little as one-fiftieth of an inch in the height of any notch.

But even the best of key locks can be opened either with a skeleton key or with some other device of the burglar or the expert lock picker. It remained for Yale next to invent the keyless dial or combination lock so widely used today for safes and vaults. This lock is operated by a knob or handle which is turned back and forth between certain predetermined numbers. This "combination" of course is

known only to the persons who should have access to the safe. The rotation of the knob merely sets the wheels or tumblers in the mechanism of the lock so that it will slip open.

Improvements on the combination lock in 1857 produced the time

lock, in which a timepiece is set with the lock, and the clockwork operates the mechanism. Thus the lock can only be opened at a certain time. Such a lock is shown in the article on Banks.



Here we see the cylinder lock from the side, and cut away to show the mechanism. This is a "five-tumbler" lock, each tumbler working like the one described in the first pictures. As the key goes in, the tumblers are pushed up by the wedge-shaped point. When the key is all the way in, if it is the proper key, the five tumblers will all rest in its notches in such a way that the tumbler cuts are all directly in line with the cylinder division, and the inner cylinder can turn and pull back the bolt.



The Four Power Units of This Sleek Diesel-Electric Locomotive Can Generate 6,000 Horsepower

The "HORSE" That WORKS on TRACKS

LOCOMOTIVE. At the head of every railroad train is a power plant on wheels. Many a locomotive actually develops power enough to supply a small city. Most of the time, however, the "iron horse" does not use its full power. When a train is rolling along on level track, only a few pounds of tractive effort (pulling power) will keep one ton of the train's weight in motion. Full power is needed principally for starting a long train or for pulling up a steep grade.

Three major types of locomotives are in general use today. They are the *reciprocating steam locomotive*, the *diesel-electric*, and the *electric locomotive*.

The Steam-Powered Locomotive

The oldest type is the reciprocating steam locomotive. It is simply a steam engine mounted so that it moves itself (*see Steam Engine*). Steam from the long boiler is fed to the cylinders and moves pistons in a back-and-forth (reciprocating) motion. Connecting rods from the pistons move the big driving wheels.

The firebox at the rear of the boiler is fed with coal or oil. Exhaust steam from the cylinders is directed up the smokestack to create a heavy draft for

the boiler fire. This accounts for a locomotive's puffing. The pistons and connecting rods supply power to the wheels on one side a quarter turn ahead of the wheels on the other side. Thus the locomotive is never caught "on dead center"—that is, with all connecting rods straight forward or back and unable to turn the wheels. The puffs alternate between sides, four puffs marking a full turn of the wheels.

Some reciprocating steam locomotives weigh 500 tons or more and develop more than 6,000 horsepower. They can pull a freight train a mile long or pull a passenger train at about a hundred miles an hour. For extremely heavy loads or steep grades, two or more locomotives may be coupled to a train.

Other Types of Locomotives

Diesel-electric locomotives are comparable to the reciprocating type in size, power, and speed. In them, oil-burning diesel engines generate current for the electric motors which drive the wheels. After World War II the diesel-electric locomotive began replacing the reciprocating steam types on most American railroads (*see Diesel Engine*). Variations of this type

include the *gas turbine* electric locomotives which burn natural gas, oil, or finely powdered coal. In these locomotives a blast of hot gas operates a turbine which drives the electric generators. (See also *Electric Generator and Motor*; *Internal Combustion Engine*; *Turbine*.)

These types of locomotives are all *self-contained*; that is, they carry their power source with them, like a ship at sea. The *electric locomotive*, however, gets its power from the outside, through an overhead wire or third rail. A few main lines use this type of locomotive; but most of them are used in suburban service and in handling through trains near terminals. Another type of electric locomotive, powered by storage batteries, is frequently used in mines.

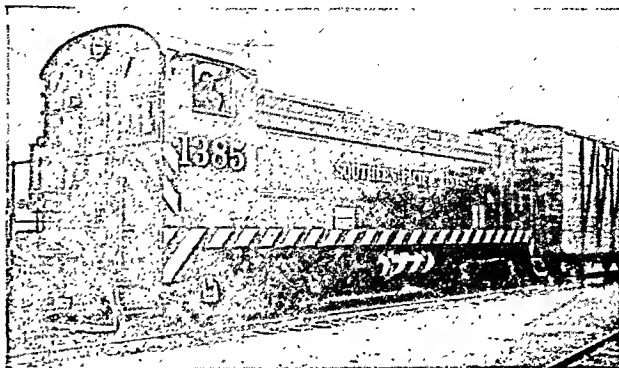
History of the Locomotive

Like all great inventions, the locomotive grew through the slow accumulation of improvements made by different inventors. Men in England worked on the idea as early as the 1700's. Most of their devices were designed to run on ordinary highways, and so were forerunners of the automobile (see *Automobile*). In 1804 Richard Trevithick ran one of his road engines on rails at Pen-y-darran, Wales, at the rate of five miles an hour. William Hedley improved on this in 1813 with his *Puffing Billy*, so called because it used exhaust steam in the smokestack, as many locomotives do today. This was the first engine to use smooth wheels on smooth track.

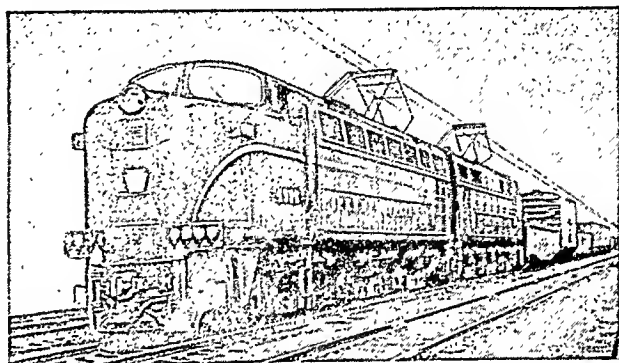
George Stephenson built a workable locomotive for the Killingworth colliery in 1815. In 1825 his locomotives ran at the rate of 16 miles an hour on the newly opened Stockton and Darlington Railway. In 1829 Stephenson and his son Robert devised a multi-tubular boiler for the locomotive *Rocket*. This boiler gave power enough to maintain a speed of 25 to 30 miles an hour, and the *Rocket* won a speed, pulling, and endurance contest held by the Liverpool and Manchester Railway. This event is considered the birth of the modern railroad.

The first American-built locomotive was the *Tom Thumb*, constructed by Peter Cooper. In 1830 this locomotive lost a famous race with a horse-drawn

"WORKING ON THE RAILROAD"



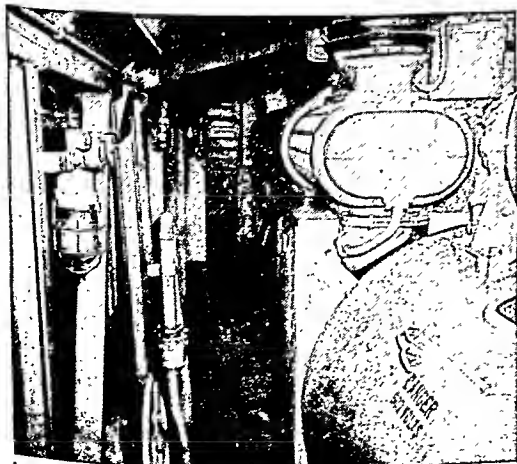
The engineer in this diesel switcher talks to the traffic control tower by means of a two-way radio in his cab.



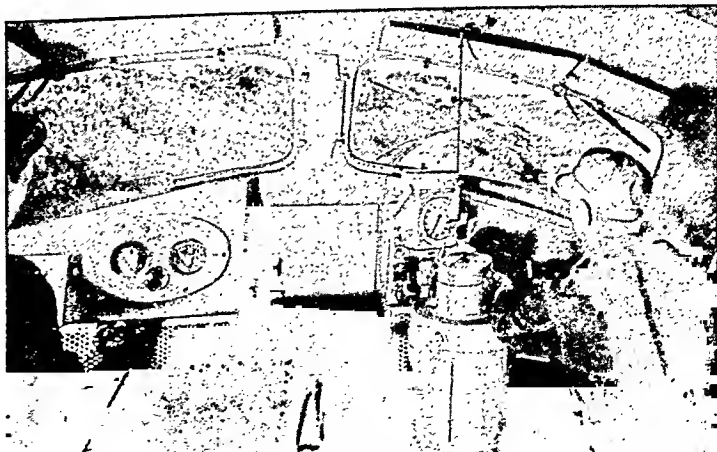
An electric freight locomotive uses a rectifier to convert the alternating current of the overhead line to direct current.



One of the newest developments in locomotives is this oil-burning gas turbine type which generates its own electric power.

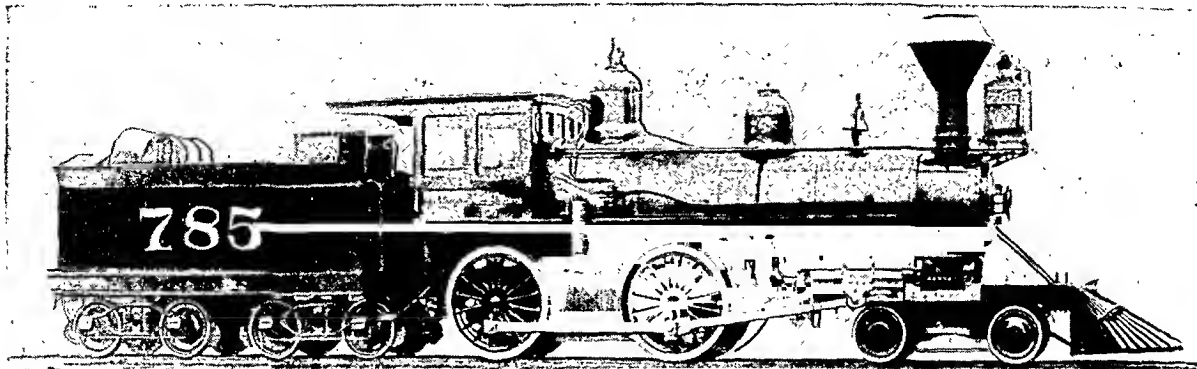


An electric generator on wheels is this power unit of a large diesel-electric locomotive. It can produce 2,000 horsepower.



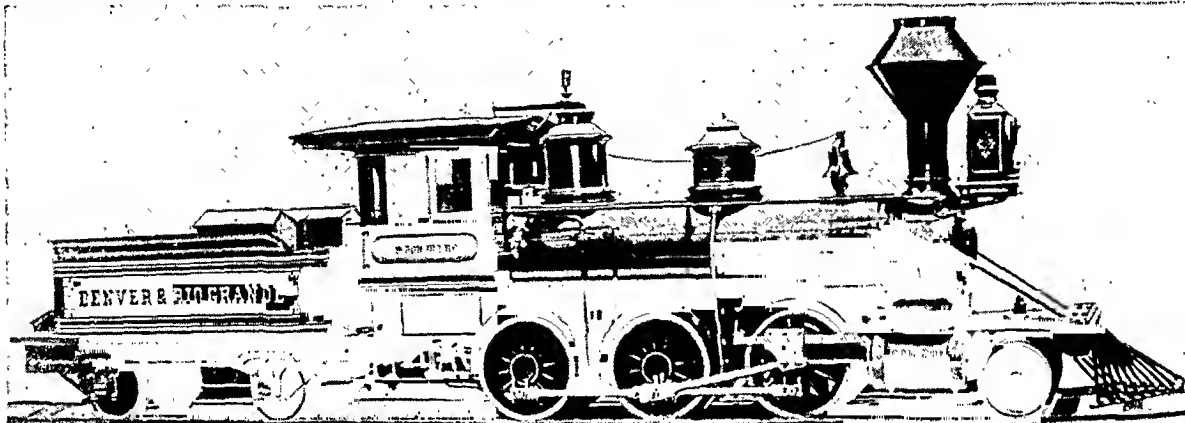
The engineer (right) and fireman (left) of this fast-moving diesel-electric locomotive see the once-formidable Rockies ahead.

CLASSIFYING LOCOMOTIVE TYPES BY WHEEL ARRANGEMENTS



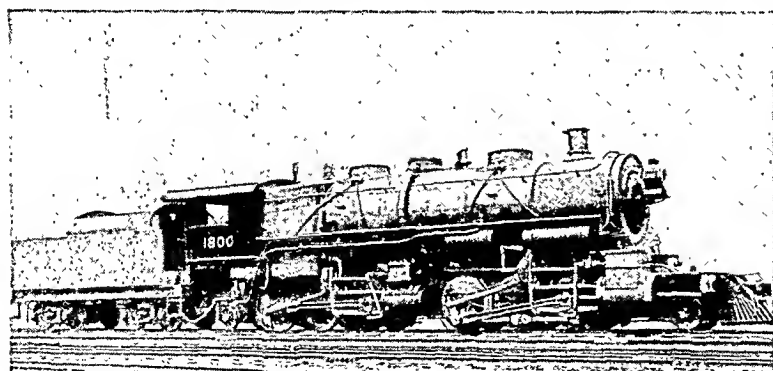
One of the basic types of steam locomotives is this *American*, which has a four-wheel leading truck and two pairs of driving

wheels. This arrangement is called 4-4-0 (the "0" meaning no trailing axle). It was the ancestor of many later types.

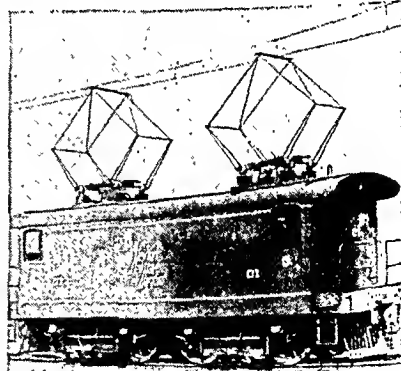


For freight service the four-wheel leading truck was replaced by a two-wheel axle and another pair of driving wheels was

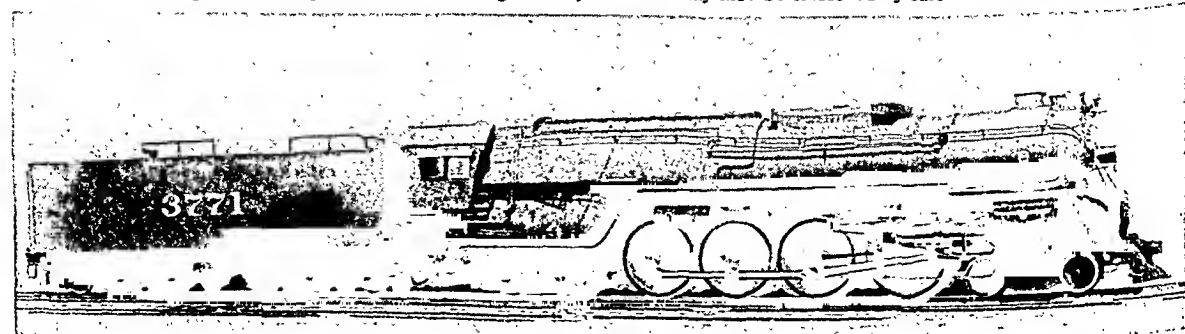
added. This made the *Mogul* a 2-6-0 type. The locomotive above is the *Show-wa-no*, first placed in service in 1871.



The largest type of steam locomotives was the *Mallet*. This was a 2-6-6-2 (a leading and trailing axle and 12 driving wheels).



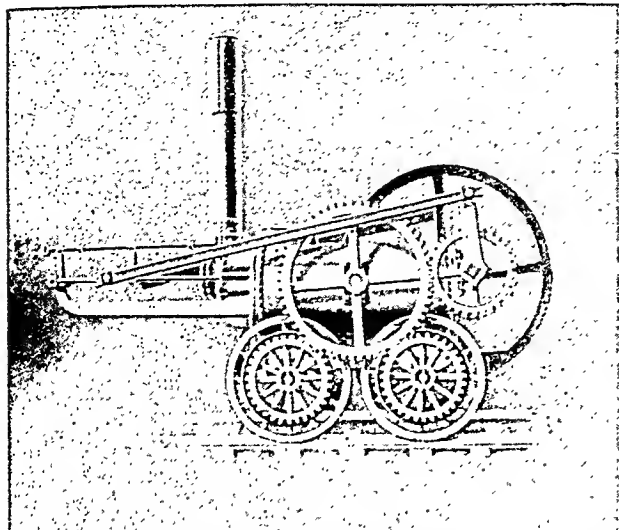
An early electric locomotive was this 0-4-4-0. Electric locomotives may also be classified by idle and driving axles.



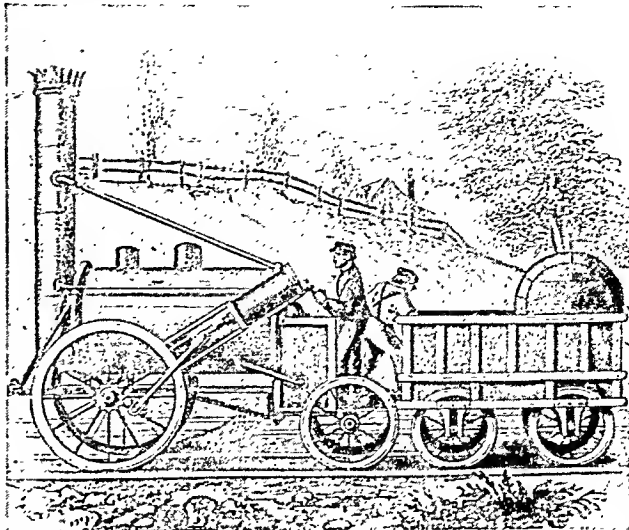
This 4-8-4 steam locomotive is the *Northern, Niagara, or Pocahontas*. The identification of steam locomotives by counting

the wheels in a truck is known as the Whyte system, which may also be illustrated symbolically as 00000000 for the 4-8-4.

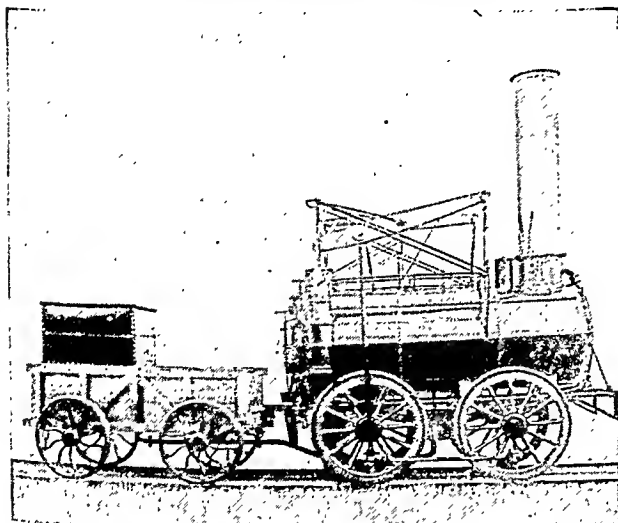
FIVE PIONEERS AMONG STEAM LOCOMOTIVES



The first locomotive in the world to do actual work was this one built by Richard Trevithick in 1804. It pulled a short train of cars uphill on a coal-mine railway in Wales.

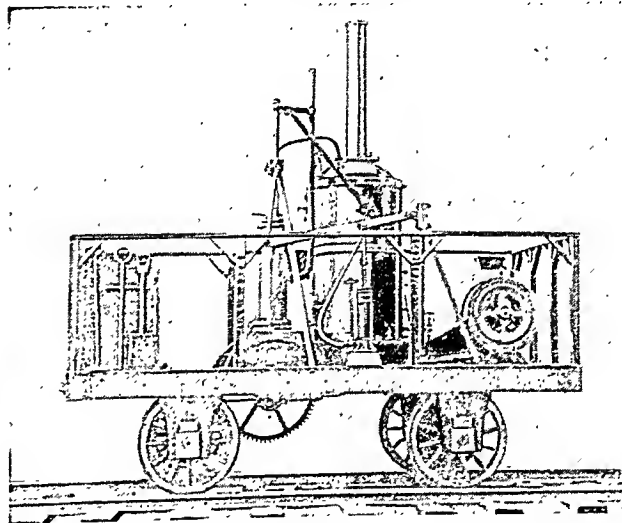


The British *Rocket*, built by George and Robert Stephenson, demonstrated the first really successful use of steam power in the famous locomotive trials at Rainhill, England, in 1829.



The first steam locomotive to operate in America was this British-built *Stourbridge Lion*. It made a trial run in Pennsylvania, but proved to be too heavy for the tracks.

car on the newly laid tracks of the Baltimore and Ohio Railroad. American-built locomotives that were placed in operation in 1830-31 were the *Best Friend of Charleston*, *West Point*, *York*, and *DeWitt Clinton*. (See also Railroads.)

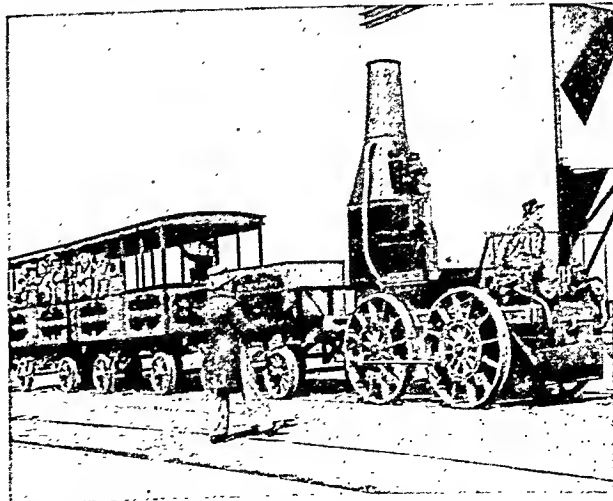


Peter Cooper's *Tom Thumb* was the first American-built locomotive to operate in the United States. Weighing only one ton, it lost a famous race with a horse-drawn car on Aug. 28, 1830.

LOCOMOTIVE WHISTLE AND HORN SIGNALS

o indicates short sounds, — longer sounds.

- o..... Apply brakes. Stop.
- oo..... Engineer's answer to signal.
- ooo..... When standing, back.
- ooo..... When running, stop at next station.
- oooo..... Call for signals.
- oooooooo..... Alarm for persons or livestock on track.
- oo..... Approaching station or junction at grade.
- oo..... A second section is following.
- ooo..... Flagman protect rear of train.
- o..... Release brakes. Proceed.
- o—o..... Approaching public crossings at grade.



The American-built *Best Friend of Charleston*, operating on the South Carolina Railroad, opened regular service Dec. 25, 1830.

LOCUST. The "17-year locust" is a *cicada* (see Cicada). The name locust is properly applied to the short-horned grasshoppers. These are the "locusts" mentioned in the Bible. They still appear at times in vast numbers in oriental countries and in the western United States. A column of flying locusts has been seen in India estimated to be several hundred miles long and dense enough in some places to obscure the light of the sun. (See Grasshopper.)

LOCUST TREE. In Maytime the locust tree flaunts its plumelike clusters of creamy white or reddish flowers, scenting the air with their honey-sweet perfume, while the graceful sprays of its pale green leaves form a beautiful setting for the delicate blossoms. In September pods appear on the flower stalks. Varying from a spreading shrub to a slender tree of 70 to 80 feet in height, the locust holds a place among the most beautiful park and forest trees of eastern North America. There are a number of different species. The black or yellow locust, found from Pennsylvania southward to Georgia and westward, has white blossoms. The clammy locust, which is so called from its sticky clammy buds and branchlets, thrives farther south and bears very showy pink flowers. The rose or moss locust is rather shrubby in habit of growth, and its blossoms are especially large and deep rose in color.

Because it is tough and durable, locust wood is used in shipbuilding, and for fence posts, wheel spokes, and railroad ties.

Although they all belong to the pea family, several trees with the name locust are not true locusts. The honey locust, common from New York southward and westward, belongs to the genus *Gleditsia*. A mass of feathery leaves and unusually long, flat pods distinguish the tree. The greenish-white flowers are less conspicuous than those of the true locusts. The carob, or St. John's bread, which flourishes along the Mediterranean, has pods which are used as food for

stock and sometimes as human food. These pods are dried and exported, and may occasionally be purchased at our fruit stands.

Scientific name of the black or yellow locust, *Robinia pseudacacia*. Bark reddish-brown, rough and broken in ridges. Leaves compound, alternate, with leaf-stalks hollowed at base and covering buds of the succeeding year, odd-pinnate with from 11 to 25 leaflets. Flowers white, fragrant, growing in loose axillary racemes. Pods linear, glabrous, containing from 4 to 6 brown seeds, remain on trees over winter.

LOG, SHIP'S. Navigators cannot learn a ship's speed accurately by knowing only how fast the ship's engines are running. Wind and current may carry the ship ahead or push against it and slow it down. So navigators measure a actual speed through the water with a device called a log.

The oldest of such devices is the *chip log* of sailing ship days. It consists of a flat piece of wood shaped like a slice of pie with a radius of about five inches. The rounded edge is weighted with lead. Attached to this "chip" is a log line about 150 fathoms (900 feet) long. Knots divide it along its length into units of 47.25 feet. On the next page you can see a picture

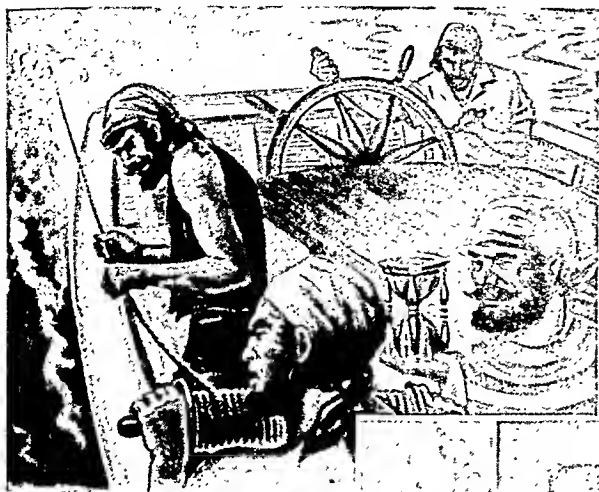


This is a fine locust tree some three feet in diameter, as you can see by the foot rule attached to the front of it. On the right is a branch with the beautiful leaves and the seed pods. The pods have a sweet pulp in them that boys, as well as wild animals, are often very fond of.

of how the log line tows the chip. One sailor holds the log-line reel, while another casts the chip overboard and counts the knots as the line streams through his hands. A third sailor watches the time shown in a sandglass. They learn the speed in nautical miles an hour by counting the knots for 28 seconds. The term "knot," meaning "one nautical mile an hour," comes from the use of knots on the log line.

A more modern device is the *patent* or *taffrail log*, shown on the next page. The ship tows a "fly" or rotator with a number of propellerlike blades. The fly rotates in the water and turns the tow line. A swivel at the end of the line on deck transmits the turns to a meter. Gears in the meter register the ship's speed on a dial, somewhat as a speedometer tells the speed of an automobile.

MEASURING SPEED THROUGH THE WATER



Here we see how sailors learn how fast their ship is traveling. The first picture shows sailing-ship men finding speed with a chip log, as described in the text. Below this picture at the left we see how the log line and a towing bridle keep the chip upright as it travels through the water. When the sailors were ready to haul the log in, they gave the line a sudden jerk. This separated the peg from the socket and the chip could be hauled in flat with the log line. The second picture shows a modern-day sailor reading a taffrail log, with an insert showing the rotating "fly" at the end of the cable. The last picture shows the principle of the pitometer log. Part A shows how pressure from both water weight and ship's speed enter the forward orifice, and how pressure from weight alone enters the side orifices. Parts B and C show the arrangement of the mercury manometer and repeater dials, described in the text.

Many large ships use a *pitometer* log. This device has a rod meter called a Pitot tube that projects through the hull into the water. A slit or orifice on the front of the meter receives pressure from both the weight of the water at that depth and the speed of the ship through the water. An orifice on each side of the meter receives pressure from the weight of the water only. Subtracting the side orifice pressure from the front orifice pressure leaves the pressure from the ship's speed.

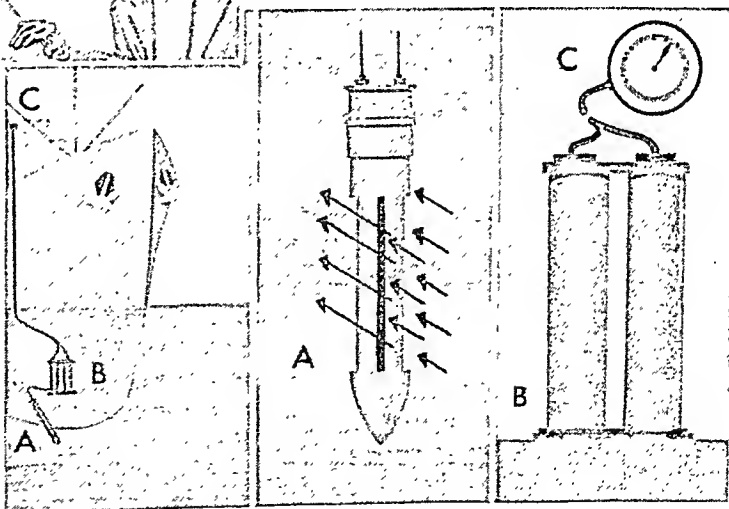
To make this subtraction, the two pressures are transmitted to a measuring device called a mercury manometer. Here the difference in pressures causes the mercury to rise in one leg of the manometer. A float on the surface rises with the mercury and rotates a dial indicating speed in knots. Another counter indicates distance traveled. Small electric motors carry the speed and distance indications to repeater dials in different parts of the ship.

Log books are official records of the ship's voyage. An officer makes periodic entries on the log book throughout the 24 hours. The entries show speeds

and distances traveled, fuel consumed, weather, and various navigational facts. They also show departures from the ship's normal routine. Dramatic stories of casualties and emergency operations are often found in the sober language of the log book. Courts of law accept statements from log books as evidence.

Naval vessels in wartime use log books to record the history of their operations. These "war diaries" provide evidence to fix guilt or innocence in cases involving breaches of the international laws of war. They also give the historian a vivid factual picture of combat at sea, written in the heat of battle.

LOGANBERRY. Next to the strawberry, the loganberry is probably our finest table berry, yet it is a comparatively recent product. It appeared in 1881 at Santa Cruz, Calif., in the garden of J. H. Logan, and is believed to be a hybrid between a wild blackberry of the Pacific coast and a red raspberry. Loganberries are now extensively cultivated from southern California to British Columbia. If protected in winter the plant can be grown in many parts of the Central, Middle, and New England states. The fruit is purplish red and very large. Its flavor is between that



of a wild blackberry and a raspberry. It is used as a dessert fruit and is extensively canned or dried. The juice is a popular beverage.

LOGARITHMS. Long multiplication and division problems can be solved by simple addition and subtraction when a person uses logarithms. And to find the cube root the only calculation necessary is division by three. Logarithms, especially as used on the slide rule, are the greatest mathematical aid ever invented by man.

A logarithm is an *exponent* applied to the number 10 (see Algebra). The logarithm 2 thus stands for $10^2 (= 100)$, and 3 for $10^3 (= 1,000)$. To multiply 100 by 1,000 we add the logarithms ($2+3=5$). And 5 is the logarithm of 100,000, the desired answer. To divide 100,000 by 1,000 we subtract the logarithms

($5-3=2$). Since 2 is the logarithm of 100, that is the answer.

Most numbers, of course, are not even powers of 10, but logarithms can be written for them by using decimal fractions. For example, the logarithm of 1,074 must be slightly greater than 3, since 1,074 is slightly greater than 1,000. Calculation shows it to be 3.0311. That is, $10^{3.0311}=1,074$.

Logarithms corresponding to the whole series of numbers have been calculated and printed in tables for reference. In the tables, only the fractional part (called the *mantissa*) is printed. The user supplies the whole part (called the *characteristic*) for himself. He knows, since the logarithm of 100 is 2 and the logarithm of 1,000 is 3, that the logarithms of all numbers between these have the characteristic 2, and so on. Decimal fractions have negative characteristics. (There is a four-place table of logarithms with the entry *Logarithm* in the *FACT-INDEX*. A few minutes' practise will help the reader to become proficient in using logarithms.)

To raise a number to a power, we multiply its logarithm by the power. To cube 1,074 we would multiply its logarithm by 3. Thus $3 \times 3.0311 = 9.0933$. The table shows that this mantissa corresponds to the number 1.239. Because of the characteristic 9, it must be written 1,239,000,000. Computation shows this to be very close, considering the size of the number, to the actual answer—1,238,833,224. To find the square root of 1,074, we would divide its logarithm by 2 and then find the corresponding mantissa and number.

Logarithms of a very peculiar kind were invented by John Napier in 1614. By 1624 Henry Briggs and Napier devised the form described in this article. (See also *Slide Rule*.)

LOGIC. The study of the various steps and processes involved in reasoning is called *logic*. A person does not need to study logic in order to think correctly and to argue persuasively. But the study will provide means for testing the accuracy of his own conclusions and those of others.

Reasoning is of two general kinds, called *deductive* and *inductive*. If we take a general principle and draw a specific conclusion from it, we are using deductive reasoning. On the other hand, if we take a number of established facts and draw a general conclusion from them, we are using inductive reasoning.

A deductive argument is frequently stated in the form of a *syllogism*, a device invented by the Greeks. It consists of three parts, *major premise*, *minor premise*, and *conclusion*. This is an example:

Honest men do not lie;
Jones is an honest man;
Therefore Jones does not lie.

Broken down in this way, an argument is far easier to test for fallacies than when it is stated in the ordinary conversational form.

The principles of inductive reasoning were stated by Aristotle but were little used until the time of Sir Francis Bacon in the 17th century. The conclusions

of modern science are almost entirely inductive. A medical man, for example, may gather all the facts he can about a certain disease from observation and experiment. Then he draws the inductive conclusion that a certain microbe causes this disease.

The conclusion of a deductive argument *must* be valid if the premises are sound and the conclusion is properly drawn. But an inductive conclusion is never final. It is based on facts as known, and it is always subject to revision if new facts come to light.

LOGWOOD. The reddish dye made from logwood was once so valuable it led to a war. Capt. Robert Jenkins was a loyal subject of King George II of England. He was caught, so the story goes, smuggling logwood from the forests of Central America. The Spaniards who owned the forests cut off one of his ears. When Parliament heard about it seven years later (1739), indignation ran so high it brought on war with Spain—the “War of Jenkins’ Ear.”

Logwood grows to be a tree from 30 to 50 feet in height. It gets its name from being shipped in the form of logs. The tree is found in the West Indies, Mexico, and Central America. It is ready for cutting when about ten years old. It is then stripped of the bark and sapwood, which are worthless, and cut into three- or four-foot lengths.

The heartwood, which is very hard and heavier than water, takes on a beautiful brownish-red color when it is exposed to air. This is due to a crystalline substance called hematoxylin. It is extracted from the wood and is used in making dyes—purple, blue, gray, and black. It is used in dyeing cotton, silk, wool, and leather, and also in ink, in stains in microscopical preparations, and in medicine.

The finest kind and the greatest quantity of logwood come from Campeche in Mexico, and so it is often called “Campeachy wood.” Scientific name of the tree, *Haematoxylon campechianum*.

LOHENGRIN (*lō'ēn-ġrīn*). This “Knight of the Swan” is the hero of a beautiful medieval German legend. According to the story, Elsa, a lovely young duchess of Brabant, was in distress and longed for help. At last a knight appeared in a boat drawn by a silver swan. This was Lohengrin, the son of Parsifal (Percival). King Arthur had sent him from the castle of the Holy Grail to fight as her champion. Having won her cause, Lohengrin married Elsa. But he made her promise that she would never ask his name or from where he had come. They lived happily until Elsa could no longer keep from asking the fatal question. Then Lohengrin was forced to bid her farewell. The swan-boat reappeared on the river and carried him away, never to return. Wagner made this legend the subject of one of his beautiful operas.

LOIRE (*lwār*) **RIVER.** The longest river in France is the Loire. Its whole course covers about 629 miles. The Loire rises in southeastern France, only 85 miles north of the Mediterranean Sea and flows northward for more than half its course. Then it sweeps with a great curve toward the southwest and flows into the Bay of Biscay.

The Loire rises in a spur of the Cévennes Mountains some 4,500 feet above sea level. Its headwaters are fed by melting snows from mountain peaks. As it races through narrow gorges it carries remains of old volcanic eruptions. Below the mountains it flows through gentle lowlands and through the Paris Basin, the chief agricultural region of France.

With its many tributaries, the Loire Valley has been called the heartland of France. The Loire uplands produce rye and buckwheat. The great bend of the river near Orléans supports grazing lands. Great stretches of the valley are planted with vegetables and fruit, especially grapes. In some places the land is worked so intensively that farmers leave fields unfenced to get more room for crops.

The Loire is of little use for navigation, except for rafts. Rocks and gravel choke its mountain course, and sediment from the Paris basin clogs its lower channel. In summer the Loire shrinks to a maze of sandbars and shallows. But many canals have been built to aid navigation through its valley and connect it with the Seine and the Saône. In the rainy season tributaries increase the volume of the Loire, and it floods wide stretches along its banks. Some cities, such as Tours, have built large protecting dikes.

LOMBARDS. The most productive region of Italy is Lombardy, the great fertile valley of the Po River. It takes its name from the barbarian Lombard hordes who overran it in the 6th century. These people were the last Germanic invaders of Italy. They pressed down from the north in A.D. 568 within 15 years after the emperor Justinian had expelled the East Goths (see Goths). The Lombards soon held most of the peninsula, though Rome, Ravenna, and a few other fortified cities successfully resisted their attack. But they failed to establish a strong central government. Many small dukedoms grew up and cut Italy into small divisions. The rivalries of these dukedoms helped develop the disunion which lasted until Italy was unified in 1870.

The Lombard kingdom in the valley of the Po existed a little more than two centuries. It was overthrown by Charlemagne in 773. He invaded Italy at the request of the pope, dethroned the king, and was himself crowned with the "iron crown" of Lombardy. The crown was so called because beneath the gold was a circlet of iron, said to be made from one of the nails with which Christ was crucified. After the breakup of Charlemagne's empire the Lombards gradually merged with the other peoples of Italy.

The energetic people which grew from this fusion of Latin and Teuton became famous from the 13th to the 16th centuries for their success as merchants and

moneylenders. So many of them came to London and other European cities that all Italians north of the Alps came to be known as Lombards. Finally the name "Lombard" became synonymous with "moneylender." The street in London which corresponds to Wall Street in New York is still called Lombard Street. **LONDON, JOHN GRIFFITH (1876-1916).** No tale that Jack London wrote is more exciting than his own life story. From his adventurous years as a sailor and gold prospector, he drew dozens of books and short stories. But like many of his heroes he died unsatisfied and short of his goal.

His father, William Chaney, a traveling astrologer, met Jack's mother, Flora Wellman, in Seattle. Jack was born in Oakland, Calif. Eight months after his birth, his mother married John London.

Jack London's boyhood was grim. His foster father drifted from job to job around Oakland and San Francisco. His mother's elaborate schemes for making money failed. Jack began early to help support the family by carrying papers, delivering ice, and working in a mill and canneries. Fascinated by books about the sea, he learned sailing while robbing oyster beds in San Francisco Bay. Later he worked in the fish patrol that policed the oyster beds. At 17 he sailed on a seal-hunting voyage to Siberia and Japan.

Home again, London worked briefly, then traveled across the country as a tramp on freight trains. He became interested in socialism, and made "soap box" speeches on street corners.

A growing determination to live by his head, not his hands, led him to finish a year of high school. A brilliant, determined student, he then "crammed" furiously to enter the University of California. But after one semester he had to go to work again. In 1897 he joined the Alaskan gold rush. He found no gold, but Alaska gave him his best story material. Perhaps the most popular of London's

many stories about Alaskan life is 'Call of the Wild' (1903), a tale of a giant sled dog that goes wild after its master dies. 'To Build a Fire' is an absorbing sketch of a man lost in the subzero Arctic wastes.

A great reader himself, London sometimes tried to make his characters both adventurers and scholars. 'The Sea Wolf' (1904) is a curious story of a brutal sea captain devoted to poetry and philosophy.

London's writing schedule of a thousand words a day brought him wealth, but he spent or gave away all of it. Two marriages turned out unhappily. He spent his later life at his Beauty Ranch in California. After Wolf House, his "dream castle," burned before completion in 1913, he was a tired, sick man. He renounced socialism, just as the hero of his 'Martin Eden' did, and died in 1916.

JACK LONDON—STORYTELLER



London did much of his best writing outdoors, especially at sea on the deck of his yacht.

LONDON—*The* WORLD'S LARGEST CITY

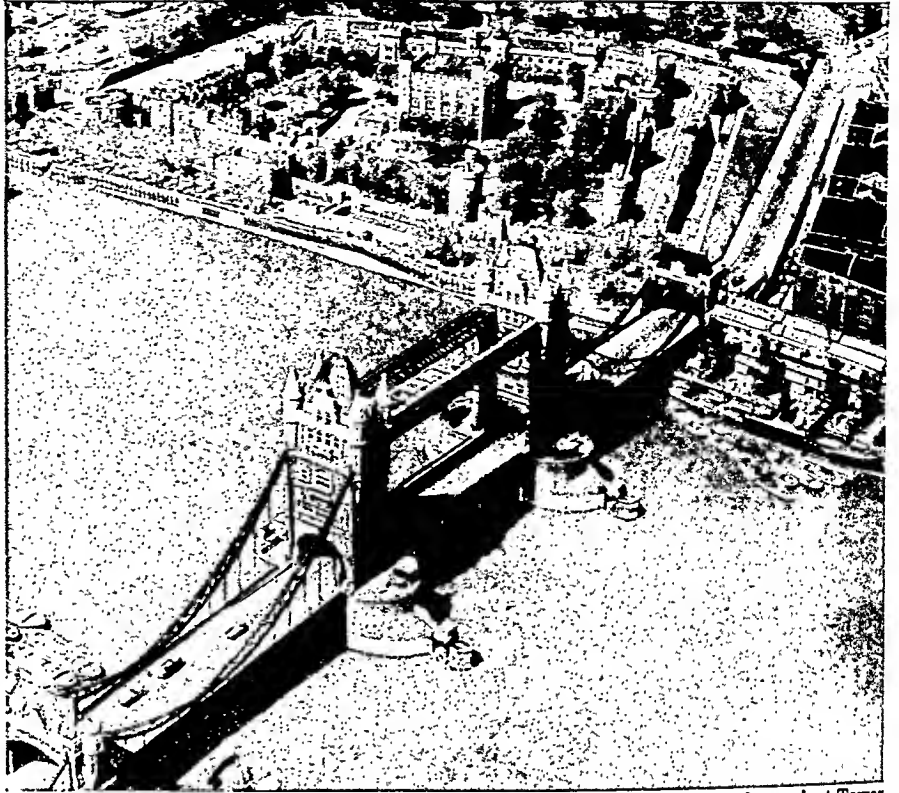
LONDON, ENGLAND. London is the capital of Great Britain and the mother city of the British Commonwealth and Empire. It is the seat of the world's oldest parliamentary government, yet it retains all the pomp and ceremony of a medieval kingdom. It is a great industrial city, an international center of finance, and a huge port. Greater London is the largest city in the world.

The visitor to London usually sees little of its great port and factories. He is more interested in its historic palaces and churches, which link the present with the past, and in the ancient Tower of London, which makes history visible in stone. The very streets of London are memorable because they are associated with characters in English fiction as well as with great men of the past who actually trod them.

Beginnings and Growth

London owed its rise to its situation on the Thames River (*see* Thames). This river is the outlet for the English plain, and it is also the principal gateway into England from the continent of Europe. When the Romans occupied England—in the 1st century A.D.—there was already a small village on Lud Hill, about 60 miles above the mouth of the Thames. Below this point the shores were swampy. At Lud Hill, on both sides of the river, was firm ground on which ships could unload, and here also was the lowest point at which the river could be easily forded or bridged. On Lud Hill the Romans built Londinium, "the City," and ringed it with massive walls reaching down to the Thames. They also built the first London Bridge and laid six roads radiating from it to the north and south. The City was soon crowded with merchants dealing in tin, cattle, hides, and slaves.

About a mile west of the old walled City of London there grew up on the Thames the City of Westminster. Here the king lived and Parliament met, and here also Westminster Abbey, the coronation church. The riverside street between the two cities—called the Strand (shore)—became lined with palaces and gardens. Other residences spread over the high ground north of the Thames and later over the low ground in Southwark, at the south end of London Bridge.



No spot in London calls up more memories of historical names and events than the ancient Tower of London. Tower Bridge, across the Thames, was built in the 19th century.

The City of London became the home of great craft and merchant companies (*see* Guilds). It preserved a degree of independence from the king in Westminster and jealously guarded its privileges. William the Conqueror was compelled to treat with it as a separate state. He built a strong fortress—the famous Tower—to overawe its citizens; but he had to place it outside the city walls.

Throughout the Middle Ages the City kept within the small crescent fixed for it by the Roman wall. Only a remnant of that wall remains today, but the names of its gates survive in such streets as Newgate, Aldgate, Cripplegate, and Ludgate, as well as in the fish market of Billingsgate on the Thames, an old port of the City. Gradually the City spread west to Temple Bar, at the eastern end of the Strand. But it kept to itself and refused to extend its boundaries farther.

In 1665 the Great Plague ran its course in London. The next year the Great Fire destroyed the City. London quickly recovered from both calamities. Sir Christopher Wren, genius of church architecture, rebuilt many of the City's ancient churches. His masterpiece was the new St. Paul's Cathedral on Ludgate Hill (the ancient Lud Hill). The dome of this great church is still one of the highest points in London.

In the 18th century London grew from 500,000 to 1,000,000 inhabitants. In the 19th century it became the largest and wealthiest city in the world. Beautiful homes spread over the West End, the area around

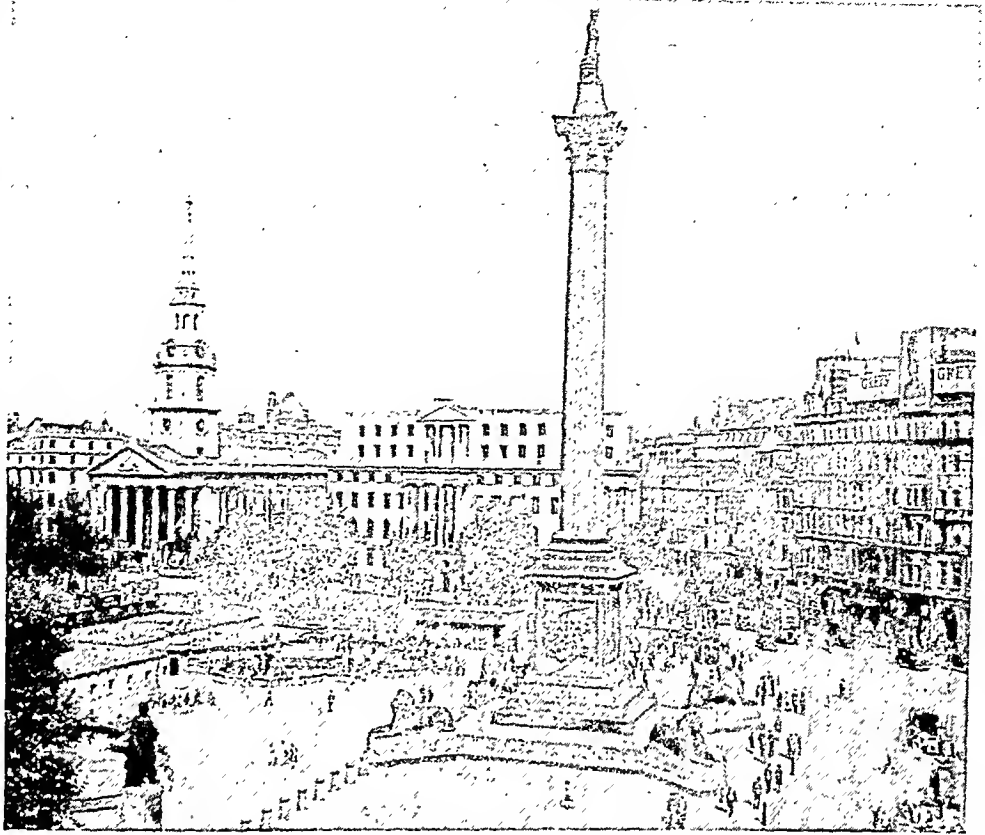
TRAFALGAR SQUARE, IN THE HEART OF LONDON

Westminster. The old City became a world center of finance. Up the muddy waters of the Thames came ships of all nations, with every kind of cargo. Most English railways made London their terminal. Highways also radiated from it in all directions. While London owes its importance principally to commerce, it is also a great manufacturing center, turning out clothing, foodstuffs, furniture, machinery, and miscellaneous products.

In the second World War, London suffered heavily from bombing. From August 1940 to May 1941, bombers came over night after night from Germany. The heaviest attack came on Dec. 29, 1940, when incendiary bombs caused London's second Great Fire. In 1944 came jet-propelled rockets, launched from bases in France. Many people spent the nights in stations of the Underground railway. Thousands were killed, and many thousands were made homeless. In the mile-square City, 134 acres were leveled to the ground.

Streets, Squares, and Houses

As London grew, it swallowed up more than a hundred towns, villages, and parishes. Many of these

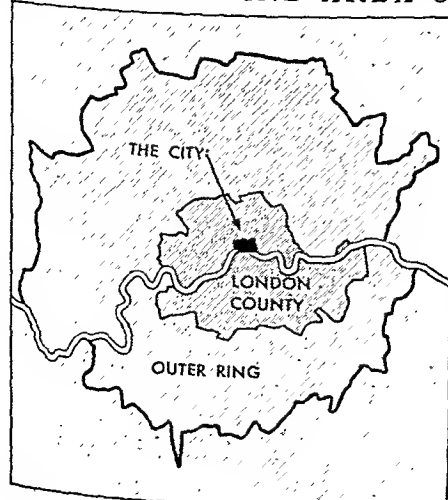


The Nelson Monument, 185 feet high, stands at the south end of this traffic center. The church is St. Martin's-in-the-Fields. The wide street on the right is the famous Strand. When Londoners want to demonstrate for or against the government, they gather in this spacious square.

communities retained their names and their individual character, along with their irregular street systems. The main east-west thoroughfares follow the windings of the Thames. Others cut across them, making a beeline for one of London's 15 bridges. A wide boulevard, called the Embankment, now borders the north bank of the Thames, hiding London's historic water-front street, the Strand.

The clay soil made difficult the construction of tall buildings, and the development of transportation encouraged the growth of suburbs. London therefore spread out horizontally and now covers an area about half the size of Rhode Island. Even in central London there are few buildings more than six stories high. Blocks of apartment houses are beginning to replace private homes; but the typical street is still lined with narrow-fronted stone or brick residences dating back to the 18th or 19th

POPULATION AND AREA OF THE "THREE LONDONS"



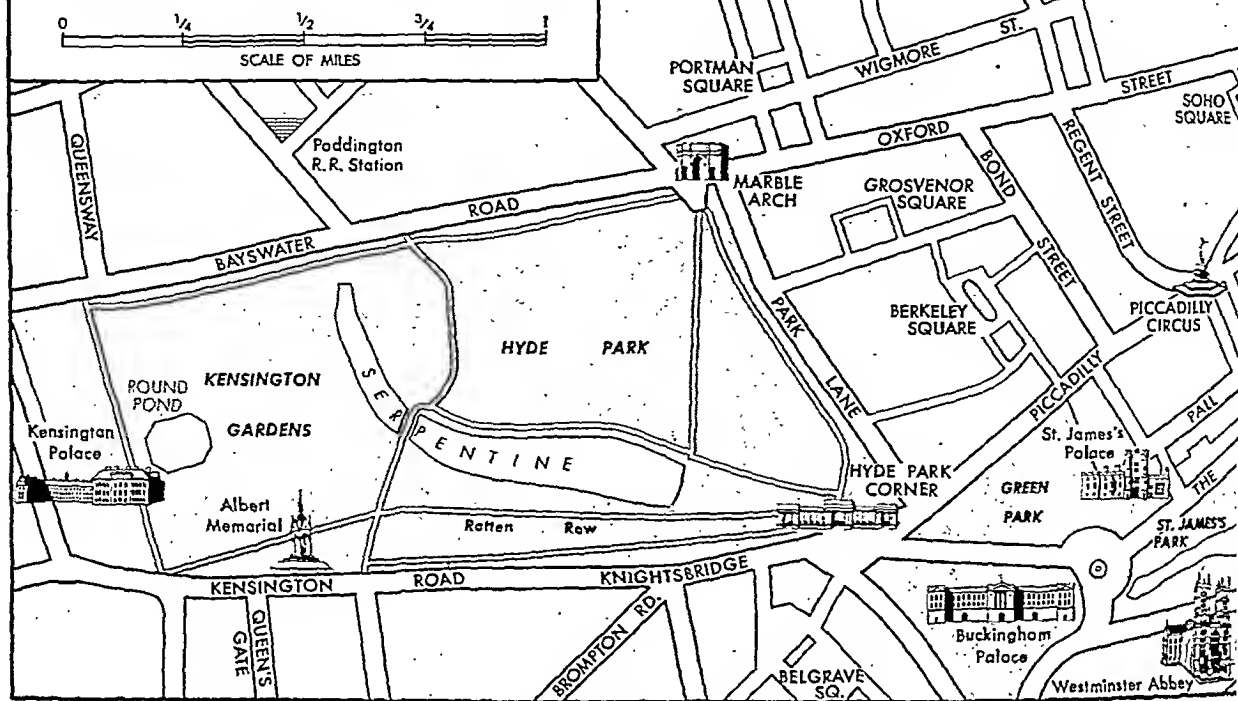
The City of London is the ancient core of the metropolis, the center of commerce and finance. It has its own lord mayor and its own police force. Area, 677 acres; population (1951 census, preliminary), 5,268.

London County is the area administered by the London County Council. It includes the City of London and 28 boroughs. Area, 117 square miles; population, 3,348,336.

Greater London is the entire area served by the Metropolitan Police (headquarters, New Scotland Yard) and the City police. It includes London County and the "Outer Ring," a belt made up of Middlesex County and parts of Essex, Kent, Surrey, and Hertfordshire. Area, 693 square miles; population, 8,346,137.

CENTRAL LONDON

Its Historic Buildings and Famous Streets



century. The houses gain in impressiveness by being built in an unbroken row. From every roof rises a cluster of chimney pots. Each chimney pot is the flue of an open fireplace that heats a single room.

The Londoner is seldom far from grass and flowers. Scattered over the city—particularly in the West End—are great parks and dozens of small green squares. The parks are open to the public, but the squares belong to residents of the district and are private. Frequent rains keep the centuries-old turf the brightest green.

The open spaces where several streets come together are also called squares, or sometimes circuses. They may be any shape. (Piccadilly Circus is almost a triangle.) When a thoroughfare crosses a square it usually changes its name. Most of London's best-known streets are therefore less than a mile long.

Charing Cross and Trafalgar Square

The center of London is usually regarded as Charing Cross, a small traffic square near the river. Here, until 1647, stood one of the 13 crosses erected in 1291 by Edward I to his queen, Eleanor, marking the stopping places in her funeral procession. A line drawn north from Charing Cross roughly divides the residential West End from the manufacturing and commercial East End.

On the north, Charing Cross opens into Trafalgar Square, named for Lord Nelson's great naval victory (see Nelson). From the double open space formed by these two squares, important streets radiate in all directions. Here one may board a bright red two-story bus for any part of London; and here also are

three stations of London's extensive subway system, called the Underground. The older subway lines are shallow and brick-lined. The newer "tubes" are deep metal-lined tunnels.

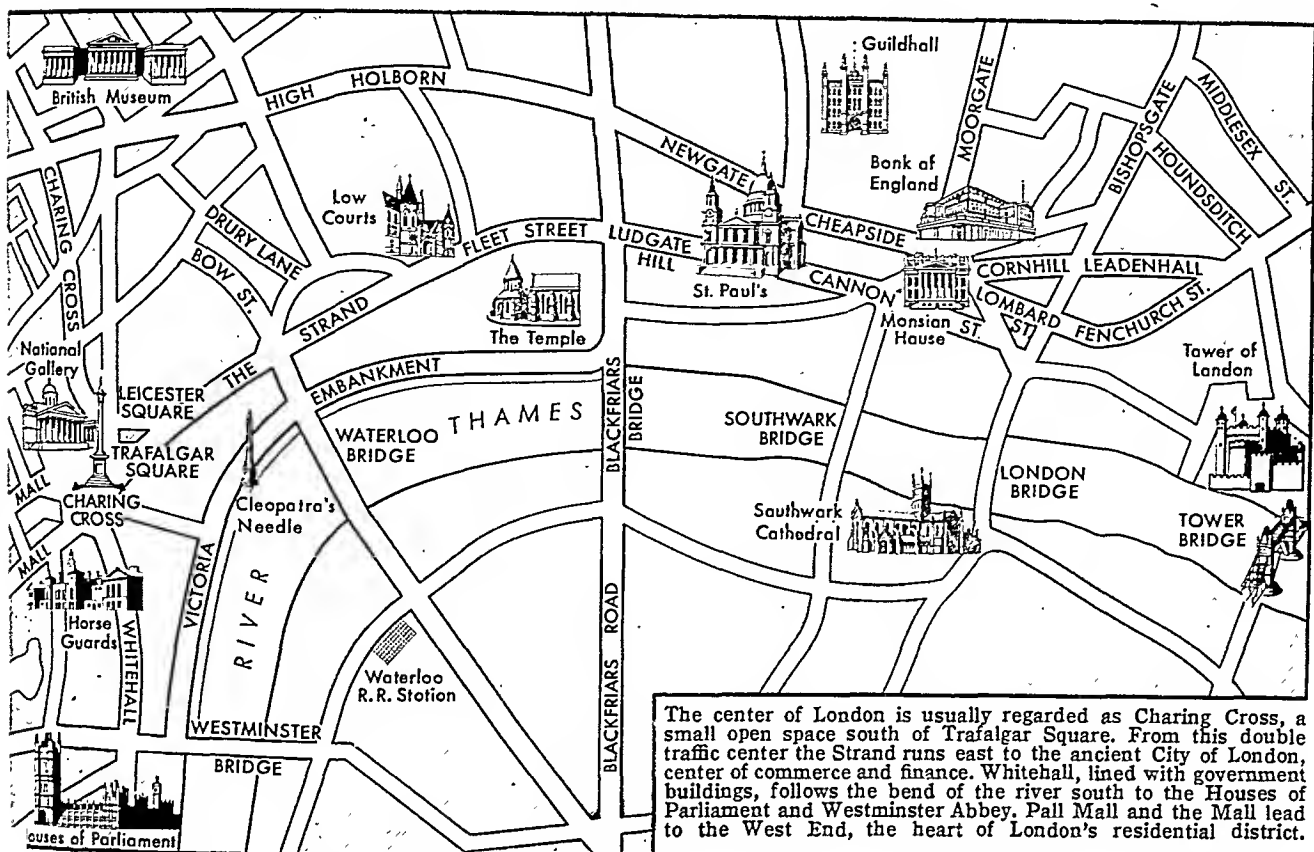
The Strand Leads to the City

From Charing Cross the wide Strand runs northeast to the old City of London, following the line of the river. This short thoroughfare was once the center of London's night life, and it still has many theaters and restaurants as well as office buildings. Just north of the Strand, on Drury Lane, is the Drury Lane Theater, long famous as the home of drama. Near it, on Bow Street (which runs in the shape of a bent bow), stands Covent Garden, the huge Royal Opera House built more than 200 years ago. The theater takes its name from an open space nearby, which was once a quiet convent garden. This open space is now London's market for fruit, vegetables, and flowers.

The Strand ends at Temple Bar and enters the City as Fleet Street. In old times Temple Bar was actually a stout wooden bar placed across the street to keep the king and his followers out of the City of London. The last barrier was removed in 1787.

The Temple and Fleet Street

Temple Bar takes its name from the Temple, which lies between Fleet Street and the Embankment. The entrance is a gateway designed by Wren. Inside is a quiet courtyard that takes us back to the Middle Ages. Then the Temple was the headquarters of the Knights Templars, a military religious order dedicated to the protection of the Holy Sepulchre. The 12th-century Temple Church is one of the finest an-



cient "round" churches of England. In Middle Temple Hall, Shakespeare is said to have played in a performance of 'Twelfth Night'.

The Temple has long been part of "legal London." The Inner Temple and the Middle Temple are two of London's "inns of court," which serve as universities for law students. They are called inns because they once furnished permanent residence for their members. They still include dining halls, libraries, chapels, and gardens as well as offices of leading lawyers. The other two inns of court—Lincoln's Inn Fields and Gray's Inn—lie north of Fleet Street. They are reached by Chancery Lane, a curving street on which many lawyers have their offices.

Fleet Street, a narrow, busy thoroughfare, was named for Fleet River (now a sewer). Here newspapers have had their headquarters since newspapers began. On the street are the offices of great London dailies. Printing is done in the maze of small courts and alleys on either side.

St. Paul's and the Bells of Bow

Fleet Street ends at Ludgate Circus, where the east-west thoroughfare changes its name to Ludgate Hill. This short street leads up to St. Paul's Cathedral, the "parish church" of the British Commonwealth and the cathedral of the bishop of London. The church is in the form of a Latin cross, 515 feet in length and 250 feet across the two arms (transepts). The diameter of the dome is 102 feet. The cross on top of the dome is 366 feet above the pavement. The vast interior is crowded with monuments, chiefly of naval and military officers. Tombs lie in

the crypt below. In the center of the crypt is the black marble tomb of Adm. Horatio Nelson, Britain's greatest naval hero.

From St. Paul's, Cheapside runs east to the "Wall Street" section of the City. This area suffered heavily in the second World War and many of its famous old guildhalls were destroyed. But Wren's Bow Church (St. Mary-le-Bow) still stands, though damaged. Bow Church was famous for its bells (now silenced) that, according to an old story, called back Dick Whittington to be three times lord mayor of London. Anyone born within the sound of Bow Bells was said to be a true Cockney—that is, a real Londoner.

The Bank of England

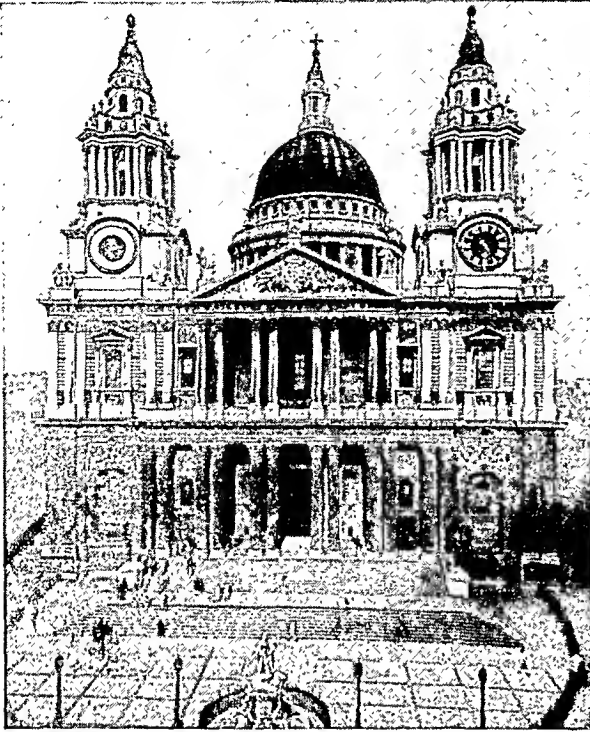
Cheapside, after changing its name to Poultry, leads to a small triangular "square" where eight streets meet. Facing this square stands the Bank of England, "the Old Lady of Threadneedle Street." Low, solid, and windowless (for greater security), the bank covers four acres. For centuries it has served the central banks of other countries throughout the world. Though nationalized by the government (in 1946), it still keeps its traditions. Its messengers are known by their pink tail coats and scarlet waistcoats.

East of the bank is the Stock Exchange and a few steps away, on Leadenhall, is Lloyd's, the world's largest and most famous insurance company. Lloyd's specializes in marine insurance, but it will insure against almost any calamity except death.

The Lord Mayor of the Mile-Square City

Across from the bank stands Mansion House, the residence of the lord mayor, chief magistrate of the

ST. PAUL'S CATHEDRAL



Wren's greatest church miraculously escaped serious damage in the second World War, when buildings near it were destroyed.

City of London. The lord mayor is elected yearly by the guilds and corporations of the City, some of which date back to the Middle Ages. The election takes place in the nearby Guildhall, a magnificent 15th-century building. After his election, tradition decrees that the lord mayor must present himself for royal approval. On November 9 he sets out in his lavishly carved and gilded coach, drawn by six horses, to the law courts in the Strand to take his oath before the lord chief justice. The citizens show their approval of their new mayor by accompanying him in gaily decorated trucks or horse-drawn carts. The mayor is always approved. Then he returns to the Guildhall for a banquet that is usually attended by the prime minister and his cabinet.

The king or queen still may not enter the City without permission of the lord mayor. Whenever the sovereign wishes to come, the lord mayor meets him at one of the gates—usually Temple Bar—and hands over a ponderous "key to the City" to open an imaginary gate. Then the sovereign enters and is welcomed by cheering crowds.

The Tower of London

Just east of the City, on the Thames, stands the Tower of London. The ancient fortress is England's most famous historic monument. For centuries it served as a state prison. It is now a museum; but the thousands of people who visit it each year are drawn to it chiefly by the memories it evokes of illustrious prisoners who were here confined or executed.

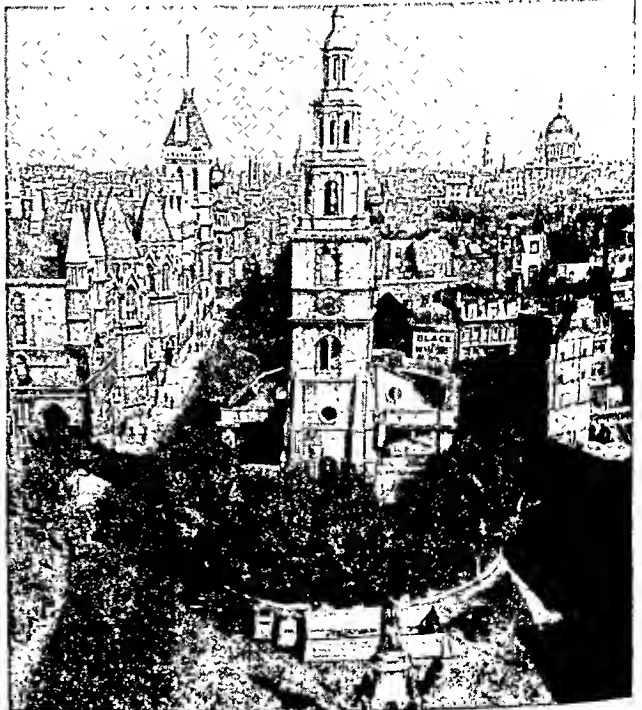
The Tower of London covers 13 acres and has all the parts of a medieval castle (*see* Castle). The moat, formerly fed by the Thames, is now dry. Inside the moat an outer wall encloses a narrow outer ward. From the inner wall 13 towers rise at intervals. This inner wall surrounds the inner ward, or "bail." In the center stands the White Tower, or Keep, the oldest part of the fortress, which was begun by William the Conqueror in 1078. It is now a museum, in which are displayed old arms, armor, and instruments of torture.

In the outer wall, facing the Thames, is Traitors' Gate, through which state prisoners, brought by way of the river from Westminster, were conveyed to the Tower. Beauchamp Tower, in the west wall, was long the principal prison for persons of rank, but the Bell Tower, the Bloody Tower, the Salt Tower, and the Broad Arrow Tower also have dungeons and other prison chambers in which historic personages were confined. Executions took place both within the Tower and outside the walls on Tower Hill. Many of those executed were buried in the Tower chapel (St. Peter ad Vincula). Among them were Sir Thomas More, Henry VIII's queens Anne Boleyn and Catherine Howard, Lady Jane Grey, and her husband Dudley. Queen Elizabeth I, when a princess, spent anxious weeks as a prisoner here; and here Sir Walter Raleigh wrote a history of the world while awaiting his tragic end.

The Crown Jewels

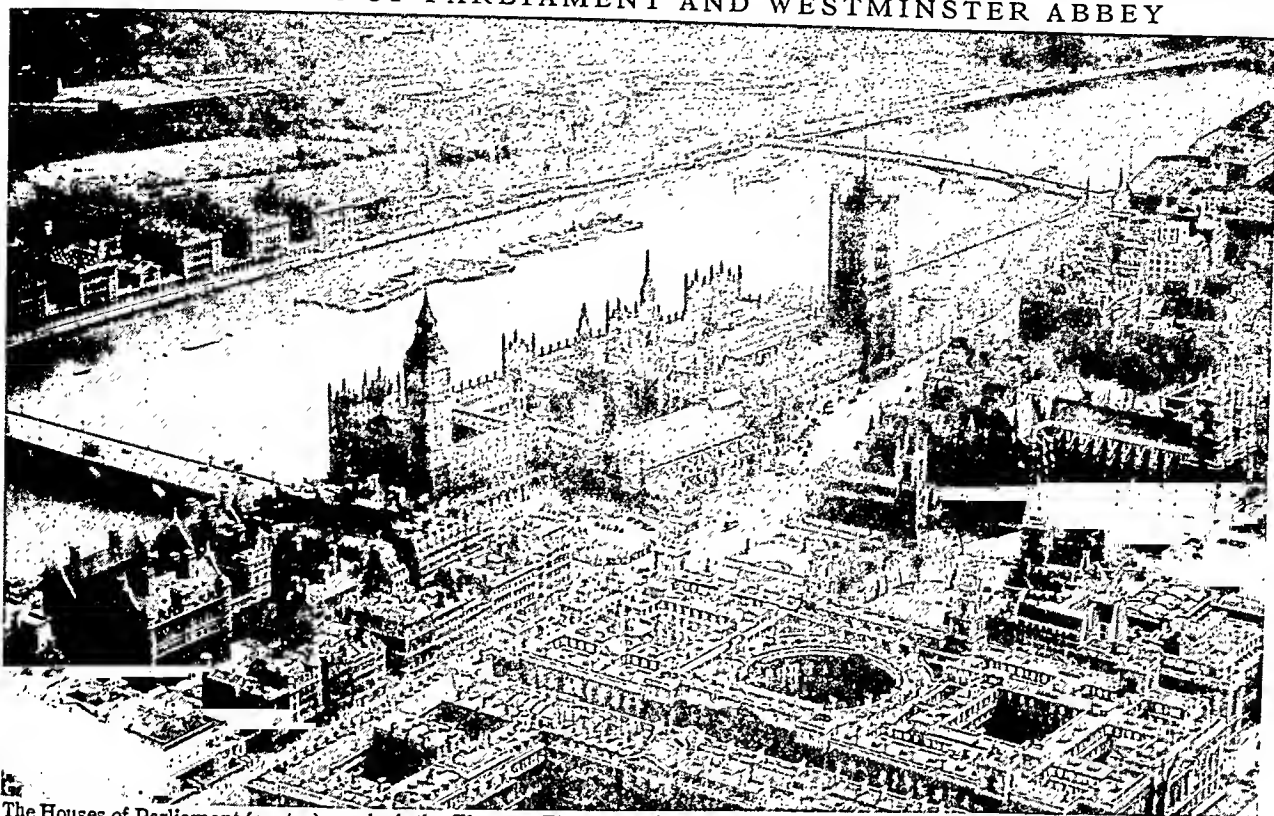
In Wakefield Tower, close to Traitors' Gate, the public may view, glittering under bright lights, the crown jewels, or regalia, of Great Britain. The coronation crown, made for Charles II in 1662, is a copy

ST. CLEMENT DANES IN THE STRAND



This Wren church, badly damaged by bombs, is famous for the rhyme, "Oranges and lemons, say the bells of St. Clement's."

THE HOUSES OF PARLIAMENT AND WESTMINSTER ABBEY



The Houses of Parliament (center) overlook the Thames. The church is Westminster Abbey. In the foreground is Parliament Street, the lower end of Whitehall, lined with government offices. Across the river is London County Hall, reached by Westminster Bridge.

of the ancient crown of Edward the Confessor, which was destroyed by Cromwell. The imperial state crown, made for Victoria's coronation, contains more than 2,700 diamonds, 300 pearls, and the Black Prince's ruby, which is almost as large as a hen's egg. The regalia includes also the ancient Anointing Spoon, used at the coronation ceremony, as well as many queens' crowns and diadems.

The guardians of the jewels and other attendants in the Tower are familiarly known as "beefeaters." They have close-cropped beards and wear scarlet doublets and knee breeches, a quaint costume that dates from Tudor times. They are all old soldiers, honorary members of the Yeomen of the Guard.

Whitehall, Heart of the Commonwealth

From Charing Cross, a short wide street, called Whitehall, follows a bend in the Thames south to the Houses of Parliament. At the north end of Whitehall are the War Office, the Admiralty, the Scottish Office, and the Treasury. Around the corner from the Treasury is No. 10 Downing Street, the modest official residence of the British prime minister. At the south end—called Parliament Street—are huge blocks of government buildings. In the center of Whitehall rises

the Cenotaph, a simple square shaft of stone commemorating the "glorious dead" of two world wars.

Whitehall takes its name from the royal palace of Whitehall, which was once the residence of the sovereign. The main buildings of the palace burned down in 1698 except for the Banqueting House. This superb building, erected by Inigo Jones in 1622, is now occupied by the Royal United Service Museum. In it are displayed miniature reconstructions of naval and military battles.

Opposite the Banqueting House stands the Horse Guards, once a guard house for Whitehall Palace, now a military headquarters. Two mounted troopers, in huge sentry boxes, guard the passage to the Horse Guards Parade, a wide graveled space. The troopers are members of the Royal Horse Guards. Every morning a small crowd gathers to watch the half-hour ceremony of the Changing of the Guard, when the troopers on duty are relieved. A more elaborate ceremony, Troop-

NO. 10 DOWNING STREET



This modest house, on a narrow street off Whitehall, has long been the official residence of the British prime ministers.

ing the Color, takes place here on the sovereign's official birthday, a Thursday in early June.

Old Scotland Yard, a short street running east from the north end of Whitehall, was the site of a palace where the Scottish kings lived when in London. In 1829

the street became the headquarters of the Metropolitan Police, and the name Scotland Yard became famous for crime detection. In 1890 police headquarters were removed to tall gray buildings, called New Scotland Yard, on the Embankment.

Parliament and Westminster Abbey

Parliament Street, at the south end of Whitehall, opens into Parliament Square, one of London's busiest traffic whirlpools. Westminster Abbey faces the square on the south. East of the square, on the Thames, stand the Houses of Parliament.

The official name of the Houses of Parliament is the New Palace of Westminster. The old Palace of Westminster was destroyed by fire in 1834 except for Westminster Hall. This beautiful building was the seat of the chief English law courts after the 13th century. Here Richard II was deposed, and here Charles I was condemned to death. Westminster Hall now serves as a spacious vestibule to the Houses of Parliament.

Parliament's "new palace," completed in 1850, was designed by Sir Charles Barry. It covers eight acres and has 1,100 rooms and two miles of passages. The House of Lords is in the southern half. The chamber of the House of Commons, in the northern half, was destroyed during the second World War and rebuilt with little change (see Parliament).

At the north end of the Parliament building rises the Clock Tower, 320 feet high. This is the home of the great bell called Big Ben. The bell weighs $13\frac{1}{2}$ tons; it is $7\frac{1}{2}$ feet high and 9 feet in diameter at its mouth. It was cast in 1858 to replace an earlier bell that cracked (1852) while being tested. The pres-

ent bell also cracked shortly after it was hung, causing a shrill note, but after the crack had been filed open and smoothed the tone became quite pure. The note is E sharp. The great bell, which rings the hours, is flanked by smaller bells that ring the quarter hours. Big Ben takes its name from Sir Benjamin Hall, who had charge of the work on the first bell. The name is also commonly applied to the tower clock. This has four faces, one on each side of the tower, with dials 23 feet in diameter.

Westminster Abbey, a great Gothic church, is the most historic building in the West End. Here England's kings and queens are crowned and some are buried; and here are tombs, monuments, and tablets commemorating statesmen and priests, scientists and artists, warriors and poets. A slab in the floor marks the tomb of an Unknown Warrior of the first World War. (See also Westminster Abbey.)

From Westminster Abbey, Victoria Street leads west to Westminster Cathedral, near the Victoria railway station. Westminster Cathedral is the most important Roman Catholic church in England. Erected in 1895-1903, it is a huge imposing edifice in an early Christian Byzantine style.

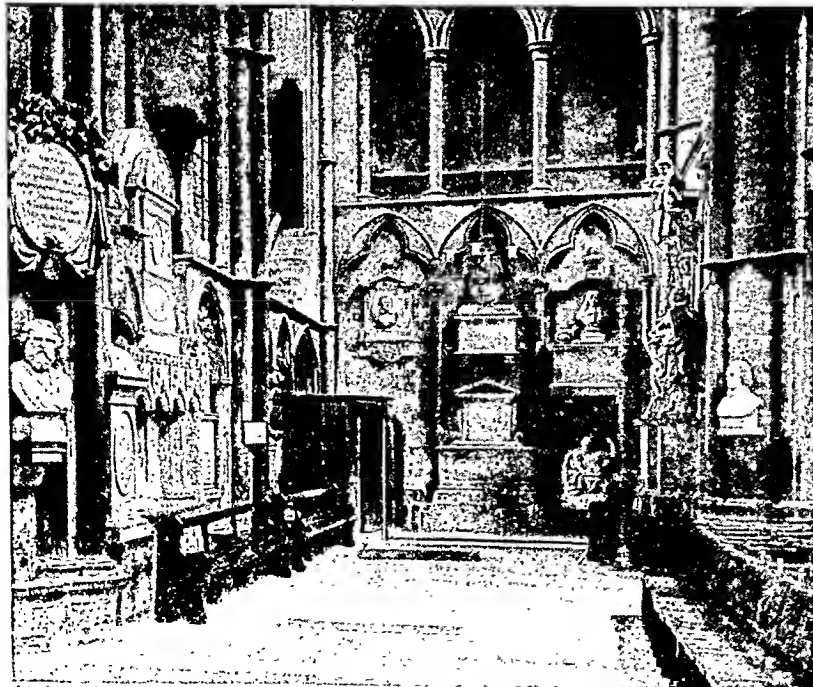
London's Parks and Palaces

From Charing Cross the Mall runs southwest to Buckingham Palace, the residence of the royal family. The Mall is a wide, tree-lined avenue, about a mile long, used for ceremonial processions. At the Charing Cross end stands Admiralty Arch. In front of Buckingham Palace rises the Queen Victoria Memorial, a white marble statuary group.

On the south side of the Mall is St. James's Park, noted for the ornamental waterfowl on its five-acre lake. On the north side of the Mall stand Marlborough House and St. James's Palace. Marlborough House is occupied by members of the royal family. St. James's was the royal residence from the time Whitehall burned down (1698) to the accession of Queen Victoria. It is now set aside for conferences and court functions. The British court is still officially known as the Court of St. James's.

Buckingham Palace, once the residence of the duke of Buckingham, was purchased by George III and rebuilt by John Nash before Queen Victoria chose it for her home in 1837. When the sovereign is in residence the guard at the entrance is changed every day at 10:30 A.M., while a guard's band plays. The palace and its 40-acre gardens are not open to the public. Constitution Hill, a beautiful avenue, runs between the palace

POETS' CORNER, WESTMINSTER ABBEY



At the left, next to the bust of Longfellow, is the Gothic tomb of Chaucer. Spenser also is buried here. Tombs and memorials of writers have overflowed from this original Poets' Corner, in the south transept, into the central aisle.

gardens and Green Park, on the north.

Constitution Hill ends with a great arch at Hyde Park Corner, London's busiest traffic center. On the north side of Hyde Park Corner stands a triple archway that is the principal entrance to Hyde Park.

Hyde Park was once a royal pleasure and hunting ground. After it was opened to the public, crowds used to gather to watch people of fashion ride on horseback or in elegant carriages around the Ring and along Rotten Row. Today the crowds gather near Marble Arch, at the northeast corner of the park, where impromptu orators speak freely on almost every subject.

Only a driveway separates Hyde Park from Kensington Gardens, to the west. Together they form a continuous park of over 600 acres. Kensington Gardens was once the private gardens of Kensington Palace, which stands at the west end of the park.

Streets and Districts of the West End

East of Hyde Park lies Mayfair, the traditional home of the English aristocracy. Its western boundary, Park Lane, faces the park. The eastern boundary is Bond Street, famous for its fine shops. Near Bond Street is Savile Row, street of fashionable tailors. High income taxes have driven out many of the former residents of Mayfair, and their stately mansions are being replaced by hotels, apartment houses, shops, and business offices.

Piccadilly, a world-famous street about a mile long, bounds Mayfair on the south. At its western end luxurious clubs overlook Green Park. Farther east are fashionable shops and hotels. Piccadilly ends at Piccadilly Circus, the center of London for the pleasure seeker. To the east is Leicester Square, heart of the theater district. To the north lies Soho, a foreign island in the West End, famous for its restaurants—French, Italian, Spanish, and Chinese.

Mayfair and Soho extend north to Oxford Street, a main east-west thoroughfare, lined with shops and department stores. North of Oxford Street is Bloomsbury, London's intellectual center, site of the British Museum and of the University of London.

South of Mayfair, between Piccadilly and Pall Mall, is a small district called St. James's, after the palace. This is the traditional home of the wealthy bachelor and the center of London's famous clubs, which have played an important part in English social and political life. Pall Mall, lined with palatial clubs, is one of London's finest streets. Both Pall Mall and the Mall

CHANGING THE GUARD AT BUCKINGHAM PALACE



When the sovereign is in residence, the elaborate ceremony called the Changing of the Guard takes place every day at 10:30 A.M. at the entrance to Buckingham Palace. Here we see the Horse Guards leaving the palace following the ceremony.

take their names from the old French game "paille maille," a kind of croquet, played here in the 17th century.

Belgravia, another fashionable district, lies south of Hyde Park. On the river is Pimlico, a busy working-class neighborhood. West of Kensington Gardens is the well-to-do residential district of Kensington. Chelsea spreads west from Pimlico along the river. It is a charming residential district, the home of artists and writers since the 16th century.

Museums, Art Galleries, and Universities

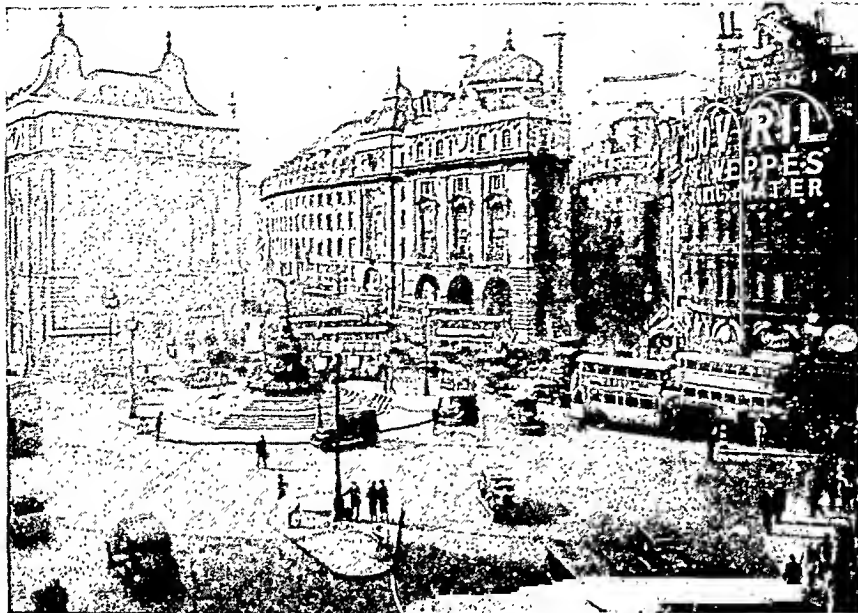
The British Museum at Bloomsbury is the oldest of national museums and is still unrivaled for the richness and variety of its collections. Its exhibits are drawn from every part of the world and represent the art of all ages. Among its most famous treasures are the beautiful sculptures called the Elgin marbles, which once adorned the Parthenon and other temples in Athens. The museum contains also one of the world's largest libraries (see Libraries).

The National Gallery, on Trafalgar Square, aims to cover the whole range of classical European painting. Here all the important old masters are represented, many of them in great works. Part of the collection is housed in the Tate Gallery, on the Thames, north of the Houses of Parliament. This gallery was originally intended to show only British art, but its scope has been widened, and it is now the National Gallery of British Paintings and of Modern Foreign Art.

The National Portrait Gallery adjoins the National Gallery. Here one may see how the nation's famous men and women looked. Portraits are chosen on the basis of genuine likeness rather than for artistic merit.

In Kensington is the vast Victoria and Albert Museum. It is concerned with arts and crafts of all

PICCADILLY CIRCUS, FAMOUS TRAFFIC CENTER



Half a dozen important streets meet at Piccadilly Circus, in the heart of London's West End. In the center rises a bronze fountain topped by a winged figure of Eros.

peoples in various periods—furniture, embroidery, jewels, miniatures, ceramics, and textiles. Also in Kensington are the Natural History Museum and the Science Museum.

The huge headquarters building of the University of London is near the British Museum. This university administers, directly or indirectly, more than 60 colleges, specialized schools, and departments scattered over London County. The best known of these are University College, near the British Museum, and King's College, in Somerset House, on the Strand.

The East End and the Surrey Side

East of the City and the Tower spreads the East End, which has more slums than any other part of London. The district suffered heavily from bombing in the second World War, and rebuilding has proceeded slowly. Back from the main, wide thoroughfares are narrow, twisting alleys lined with rows of attached box-like little houses, each with a door and window on the ground floor and two windows above. The newer buildings are blocks of flats. Whitechapel, one of London's oldest slum districts, is the center of the clothing industry. Along the water front, the life and activity of the people center in the docks. The waterside district of Limehouse, London's Chinatown, once notorious, is now quiet and respectable.

London south of the Thames—the Surrey side—is largely industrial and offers little of historic interest to the tourist. Facing the Houses of Parlia-

ment, in Lambeth, is Lambeth Palace, the London residence of the archbishop of Canterbury. Near it, at the end of Westminster Bridge, stands the huge building of the London County Council which governs London County. Near the south end of London Bridge stands Southwark Cathedral, one of London's oldest churches. Southwark was the center of stage life in Shakespeare's time. Now it is a district of drab streets. Theatergoers, however, still go to the Surrey side to see classic drama in the Old Vic repertory theater. This theater stands opposite Waterloo station, the largest railway station in the country.

A little farther down the river is the borough of Greenwich. Through Greenwich runs the meridian from which longi-

tude and standard time zones are reckoned around the world. Its National Maritime Museum contains portraits and relics of England's great sailors.

Dockland—London's Great Port

The best way to see London's great port is from one of the water busses that in summer run up and down the Thames. The best time is high tide, when ocean vessels ascend the river. Most of them quickly disappear below Tower Bridge into the maze of waterways of the inner docks. A few come up as far as the Pool,

A SUNDAY MARKET IN THE EAST END



Petticoat Lane, in Whitechapel, has changed its name to Middlesex Street, but it has not given up its street market, where everything, new or second-hand, is sold noisily. Whitechapel is a crowded foreign quarter.

between Tower Bridge and London Bridge. There the cargo is lowered quickly into barges because the ships must go downstream as the same tide ebbs.

The heart of dockland is the Isle of Dogs, a small peninsula on the north bank formed by a loop in the river. Here are the West India Docks, the oldest docks in London. Some docks specialize in handling timber, others grain or meat. Surrounding the London docks near Tower Bridge are warehouses for storing ivory, spices, gums, and rubber. Tilbury Docks, 26 miles below London Bridge by water, can receive the largest vessels afloat.

Every ebb of the tide sees ships going downstream loaded with products of British industries. But London imports much more than it exports because most of its factories supply the home market.

LONDON, ONTARIO. Like the famous city of England from which it takes its name, London, a metropolis of eastern Ontario, is situated on a river Thames. The site was chosen and the names of the town and river given by Governor Simcoe in 1792, but no building was done until 1826. When London was made the judicial center of the district soon after 1826, its real growth started. In 1854 it became a city. It is now the financial, industrial, marketing, and distributing center for a rich and thickly settled agricultural section. It is 23 miles north of Port Stanley, a harbor on Lake Erie, with which it is connected by a municipally owned and operated railway. Electric power from Niagara Falls adds to the city's advantages as a manufacturing center. Among the many products are iron and brass goods, aircraft, stoves and furnaces, enamel ware, paper boxes, electrical equipment, radios, glass, cereals, cigars, and shoes. The University of Western Ontario, founded in 1878, is situated here. Population (1951 census), 95,343.

LONG, CRAWFORD WILLIAMSON (1815-1878). On March 30, 1842, Dr. Crawford Long, a young surgeon of Jefferson, Ga., performed the first recorded operation on an anesthetized patient. He administered sulphuric ether before removing a tumor from the neck of James Venable, who felt no pain during the operation. Although the experiment was a complete success, Dr. Long did not make his work public until 1849, after he had used ether in more operations. Meanwhile the benefits of surgical anesthesia had been proved by others, and Dr. Long's delay in reporting his discovery kept him for many years from being recognized as the pioneer anesthetist (*see Anesthetics*).

Dr. Long was born at Danielsville, Ga. He entered Franklin College (now the University of Georgia) at the age of 14, and took his medical degree at the University of Pennsylvania in 1839. After 18 months of work in New York City, where he became recognized as a skilled surgeon, he returned to Georgia to practise at Jefferson.

How Dr. Long Made His Discovery

Strangely enough, Dr. Long's discovery of anesthesia was made as the result of a prank. A few weeks before the famous operation, some gay young friends of

his saw a traveling medicine vendor demonstrate a new curiosity, laughing gas (nitrous oxide). Volunteers who inhaled this gas felt extremely exhilarated. Dr. Long's friends then asked him for permission to hold a "nitrous oxide frolic" in his room. Since he had no nitrous oxide, he gave them sulphuric ether. Excited by the gas the young men became hilariously rowdy and pommelled one another severely. Dr. Long noticed with amazement that none of them seemed to feel pain, and decided to experiment with ether in his surgical work.

After his notable achievement Dr. Long continued to live the quiet life of a country doctor. In 1850 he moved to Athens, Ga., where in 1910 an obelisk was erected to his memory.

LONG BEACH, CALIF. Far-sighted industrial and civic planning and the discovery of large oil fields have developed beautiful Long Beach from a small fishing village and seaside resort into one of California's chief cities. It lies 20 miles south of Los Angeles on a strip of coastal plain between San Pedro Bay and the snow-crested Sierra Madre range. The city is built on a terrace along the miles of shining white bathing beach which make it a favorite ocean resort. Looming up behind Long Beach, right in its "back yard," are thousands of towering oil derricks.

The amazing development of Long Beach began in 1921 with the discovery of petroleum on nearby Signal Hill. This great oil field of the Long Beach region soon became one of the nation's chief producers of petroleum. Another oil field was discovered in 1940 along the tidelands of the Port of Long Beach. The city derives a large revenue in royalties from wells in this field.

Manufactures, Commerce, and Tourist Trade

Many industries soon came to Long Beach to use the cheap fuel provided by the oil and natural gas from Signal Hill field. They include oil refineries, aeronautical, shipbuilding, and automobile plants, gypsum works, soap factories, vegetable oil plants, canneries, and packing houses.

Long Beach promoted its growth by improving the fine natural harbor which it shares with the city of Los Angeles. The Los Angeles-Long Beach Harbor, as it is officially called, is one of the greatest on the coast. It has two ports, one operated by Los Angeles, the other by Long Beach. To develop its own port, Long Beach has spent huge amounts from municipal oil royalties.

The city's mild climate attracts thousands of tourists every year. Catering to visitors is still a major business. Surf bathing, boating, and fishing are popular year-round sports.

The city is governed on the council-manager plan. It has a \$3,000,000 Civic Auditorium on the ocean front, a Marine Stadium on Alamitos Bay, and a 740-acre municipal airport. It also has many fine parks, libraries, a city college, and a state college.

Long Beach was founded in 1881 by W. E. Willmore, an Englishman, and named Willmore City. It was incorporated as a city under its present name in 1888. Population (1950 census), 250,767.

LONGFELLOW, *Best Loved of AMERICAN POETS*

LONGFELLOW, HENRY WADSWORTH (1807-1882). Probably the best loved of American poets the world over is Henry Wadsworth Longfellow. Many of his lines are as familiar to us as rhymes from Mother Goose or the words of nursery songs learned in early childhood. Like these songs and melodies, they remain in the memory and accompany us through life.

There are two reasons for the popularity and significance of Longfellow's poetry. First, he had the gift of easy rhyme. He wrote poetry as a bird sings, with natural grace and melody. Read or heard once or twice, his rhyme and meters cling to the mind long after the sense may be forgotten or become unimportant.

Second, Longfellow wrote on obvious themes which have a common appeal for many people. They were easily understood, they sang their way into the consciousness of those who read them. Above all there is a joyousness in them, a spirit of optimism and faith in the goodness of life which evokes immediate response in the emotions of his readers.

To Longfellow we owe a great debt as Americans, because he was among the first of American writers to use native themes: to write about the American scene and landscape, the American Indian ('Song of Hiawatha'), and American history and tradition ('Courtship of Miles Standish', 'Evangeline'). At the beginning of the 19th century, America was only a stumbling babe as far as a culture of its own was concerned. The people of America had spent their years and their energies in carving a habitation out of the wilderness and in fighting for independence. Literature, art, and music came mainly from Europe and especially from England. Nothing was considered worthy of attention unless it came from Europe.

But "The Flowering of New England," as Van Wyck Brooks calls the period from 1815 to 1865, was at hand in Longfellow's day, and he made a great contribution to it. He lived when giants walked the New England earth, giants of intellect and feeling who established the New Land as a source of greatness. Nathaniel Hawthorne, Ralph Waldo Emerson, Henry David Thoreau, Oliver Wendell Holmes, and William Prescott: these were a few of the great minds and

spirits among whom Longfellow took his place as a singer and as a representative of the American spirit.

Family and Boyhood

The first Longfellow came to America in 1676 from Yorkshire, England. Among the ancestors of the poet were artisans, ministers, and teachers. Among his

mother's ancestors were John and Priscilla Alden of whom he wrote in 'Courtship of Miles Standish.' His mother's father, Peleg Wadsworth, had been a general in the Revolutionary War. His own father was a lawyer, and the Longfellow home represented the graceful living which was beginning to characterize the age.

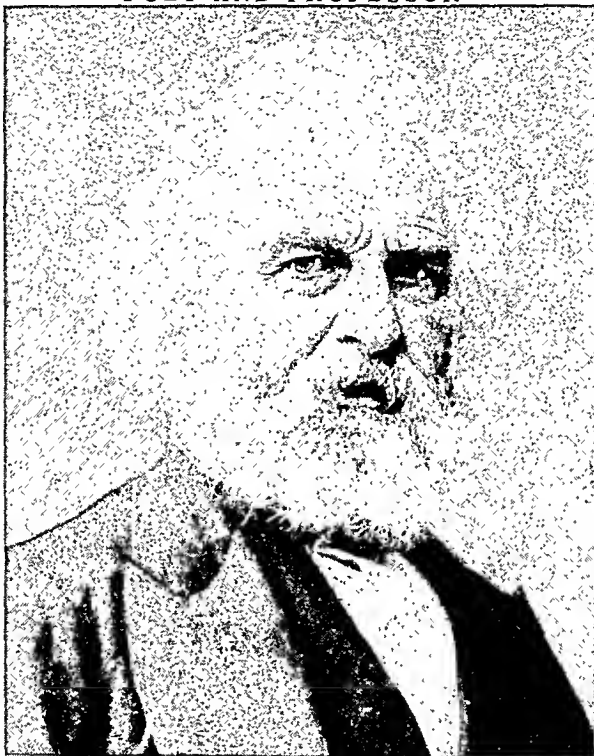
Henry was the son of Stephen Longfellow and Zilpah Wadsworth Longfellow. He was born Feb. 27, 1807, in Portland, Me. Portland was a seaport, and this gave its citizens a breadth of view lacking in the more insular towns of New England. The variety of people and the activity of the harbors and ships stirred the mind of the boy and gave him a curiosity about life beyond his own immediate experience. He was sent to school when he was

as young as three years of age. When he was six, the following report of him was received at home: "Master Henry Longfellow is one of the best boys we have in school. He spells and reads very well. He can also add and multiply numbers. His conduct last quarter was very correct and amiable."

From the beginning it was evident that this boy was to be drawn to writing and the sound of words. His mother read aloud to him and his brothers and sisters the high romance of Ossian, and Cervantes' 'Don Quixote' was a favorite among the books he read. But the book which influenced him most was Washington Irving's 'Sketch Book', the work of another American author for whom the native legend and landscape were sources of inspiration.

"Every reader has his first book," wrote Longfellow later. "I mean to say, one book among all others which in early youth first fascinates his imagination, and at once excites and satisfies the desires of his mind. To me the first book was the 'Sketch Book' of Washington Irving."

POET AND PROFESSOR



Longfellow was a striking figure, especially in later life. His flowing white hair and beard emphasized strong, peaceful features. In dress and manner he was simple and dignified.

Longfellow's father was eager to have his son become a lawyer, but when Henry was a senior at Bowdoin College at Brunswick, Me., he gently asserted himself. He wrote his father, "I most eagerly aspire after future eminence in literature." It is significant that his graduation oration was on the topic "Our Native Writers."

His Career Starts

Fortunately for Henry, when he was graduated from Bowdoin College at 19, the college established a chair of modern languages. The recent graduate was asked to become the first professor, with the understanding that he should be given a period of time in which to travel and study in Europe.

In May of 1826 the fair-haired youth with the azure blue eyes set out for Europe to turn himself into a scholar and a linguist. He had letters of introduction to men of note in England and France, but he had his own idea of how to travel. Between conferences with important people and courses in the universities, Longfellow walked through the countries. He stopped at small inns and cottages, talking to peasants, farmers, traders, his silver flute in his pocket as passport to friendship. He traveled in Spain, Italy, France, Germany, and England, and returned to America in 1829. At 22 he was launched upon his career as a college professor. He had to prepare his own texts, because at that time none were available.

Much tribute is due him as a teacher. Just as he served America in making the world conscious of its legend and tradition, so he opened up to his students and to the American people the literary heritage of Europe. He created in them a new consciousness of the literature of Spain, France, Italy, and especially of the German, Nordic, and Icelandic cultures.

In 1831 he married Mary Storer Potter, whom he had known as a schoolmate. When he saw her at church upon his return to Portland, he was so struck with her beauty that he followed her home without courage enough to speak to her. With his young wife he settled down in a house surrounded by elm trees. He spent his energies and his time on translations from

CRAIGIE HOUSE, LONGFELLOW'S CAMBRIDGE HOME



In 1836 when Longfellow came to Cambridge to teach at Harvard, he engaged a room in this fine old colonial mansion on Brattle Street. Built in 1759, it had been for a time General Washington's headquarters in the Revolutionary War. When Longfellow married Frances Appleton in 1843, his father-in-law gave them Craigie House as a wedding present. The house is now owned by the Longfellow Memorial Association.

old world literature, and contributed sketches from his European travels to *The New England Magazine*, but otherwise he engaged in no writing.

Tragedy and a New Life

In 1834 he was appointed to a professorship at Harvard and once more set out for Europe by way of preparation. This time his young wife accompanied him. The journey ended in tragedy. In Rotterdam his wife died, and Longfellow came alone to Cambridge and the new professorship. The lonely poet took a room at historic Craigie House, an old house overlooking the Charles River. It was owned by Mrs. Craigie, an eccentric woman who kept much to herself and was somewhat scornful of the young men to whom she let rooms. But she read widely and well, and her library contained complete sets of Voltaire and other French masters. Longfellow entered the beautiful old elm-encircled house as a lodger, not knowing that this was to be his home for the rest of his life. In time it passed into the possession of Nathan Appleton. Seven years after he came to Cambridge, Longfellow married Frances Appleton, daughter of Nathan Appleton, and Craigie House was given to the Longfellow as a wedding gift.

Meantime, in the seven intervening years, he remained a rather romantic figure in Cambridge, with his flowing hair and his yellow gloves and flowered waistcoats. He worked, however, with great determination and industry, publishing 'Hyperion', a prose romance that foreshadowed his love for Frances Appleton, and 'Voices of the Night', his first book

of poems. He journeyed again to Europe, wrote 'The Spanish Student', and took his stand with the abolitionists, returning to be married in 1843.

Now followed the golden years of his life. The marriage was a happy one, and the Longfellow house became the center of life in the university town.

The old Craigie House was a shrine of hospitality and gracious living. The young people of Cambridge flocked there to play with the five Longfellow children—two boys and the three girls whom the poet describes in 'The Children's Hour' as "grave Alice and laughing Allegra and Edith with golden hair."

Great Poems and a Second Tragedy

From his friend, Nathaniel Hawthorne, Longfellow got the brief outline of a story from which he composed one of his most famous poems, 'Evangeline'. The original story had Evangeline wandering about New England all her life in search of her bridegroom. Longfellow extended her journey through Louisiana and the western wilderness; she finds Gabriel at last dying in Philadelphia.

'Evangeline' was published in 1847 and was widely acclaimed. Longfellow began to feel that his work as a teacher was a hindrance to his own writing. In 1854 he resigned from Harvard and with a great sense of freedom gave himself entirely to the joyous task of his own poetic writing. In June of that year he began 'Hiawatha'.

"I have at length hit upon a plan for a poem on the American Indians," he wrote in his diary, "which seems to me to be the right one and the only. It is to weave together their beautiful traditions into a whole. I have hit upon a measure, too, which I think the right one and the only one for the purpose."

Schoolcraft's book on Indians and several meetings with an Ojibway chief provided the background for 'Hiawatha'. The long poem begins with Gitche Manito, the Great Spirit, commanding his people to live in peace, and tells how Hiawatha is born. It ends with the coming of the white man and Hiawatha's death.

The publication of 'Hiawatha' caused the greatest excitement. It was acclaimed by Emerson and Hawthorne and translated in many European languages. It was criticized, on the other hand, for the monotony of its rhyme scheme, which was borrowed from the patterns of rhythm of the Finnish epic 'Kalevala'. But for the first time in American literature, Indian themes gained recognition as sources of imagination, power, and originality. The appeal of 'Hiawatha' for generations of children and young people gives it an enduring place in world literature.

THE WAYSIDE INN



In colonial days this old inn at Sudbury, Mass., was called "Red Horse Tavern." Longfellow loved this ancient tavern, which had sheltered Washington, Lafayette, Webster, and other great Americans, and chose its parlor with the red brick fireplace as the scene of his 'Tales of a Wayside Inn'. Henry Ford restored it as a memorial to the poet.

The gracious tale of Priscilla and John Alden came next to the poet's mind, and 'The Courtship of Miles Standish' was published in 1858. It is a work which reflects the ease with which he wrote, and the pleasure and enjoyment he derived from his skill. Twenty-five thousand copies were sold during the first

week of its publication, and 10,000 were ordered in London on the first day of publication.

In 1861 the happy life of the family was to end in tragedy. Mrs. Longfellow died of burns she received while she was sealing up with matches and wax small packages of the golden curls of her children. And now the kind, the well-disposed, the yea-saying Longfellow faced the most bitter tragedy of his life. He found his greatest solace in the task of translating Dante into English and turned once more to Europe for change of scene.

Longfellow's Last Years

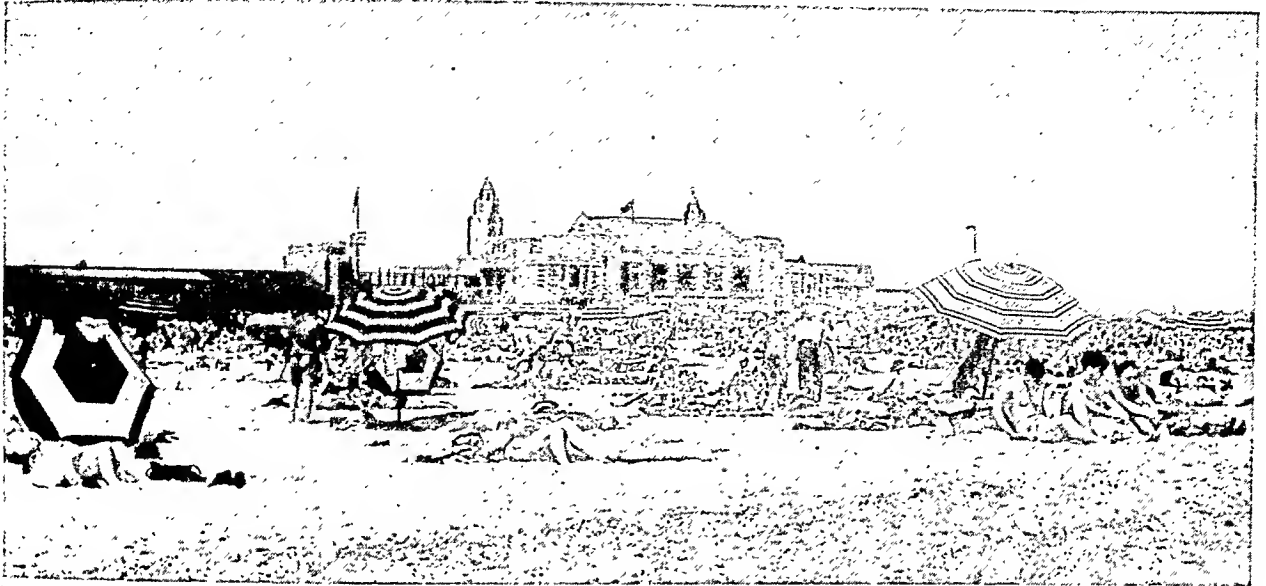
The years following were filled with honors. He was given honorary degrees at the great Universities of Oxford and Cambridge, invited to Windsor by Queen Victoria, and called by request upon the Prince of Wales. He was chosen a member of the Russian Academy of Sciences and of the Spanish Academy.

None of these honors destroyed the essential modesty and loving-kindness of Longfellow. All people, the ignorant and the wise, the humble and the famous, were drawn to him by the essential goodness of the man. When it became necessary to remove "the spreading chestnut tree" of Brattle Street, which Longfellow had written about in his 'Village Blacksmith', the children of Cambridge gave their pennies to build a chair out of the tree, and gave it to Longfellow. This honor was perhaps the one he cherished most. He lived in Craigie House, close by his children and his grandchildren. He died on March 24, 1882. "Of all the sons of the New England morning," says Van Wyck Brooks, "he was the largest in his golden sweetness."

Books by Longfellow

Longfellow's works include: 'Oute Mer' (travel sketches, 1835), 'Hyperion' (a romance in prose, 1839), 'Voices of the Night' (the first book of poems, 1839), 'Ballads and Other Poems' (1841), 'The Spanish Student' (a play, 1843), 'The Belfry of Bruges' (1845), 'Evangeline' (1847), 'Kavanagh' (a tale in prose, 1849), 'The Seaside and the Fireside' (1849), 'The Golden Legend' (1851), 'The Song of Hiawatha' (1855), 'The Courtship of Miles Standish' (1858), 'Tales of a Wayside Inn' (1863), 'The Divine Comedy of Dante Alighieri' (a translation, 1865-67), 'The Masque of Pandora' (1875), 'Kéramos' (1878), 'Ultima Thule' (1880), 'In the Harbor' (1882).

JONES BEACH ON LONG ISLAND'S SOUTH SHORE



With six miles of sand, Jones Beach can accommodate some 140,000 sea and sun bathers. They may swim in the ocean, a

sheltered bay, or a heated pool. The resort is a state park well equipped with play fields, restaurants, and other facilities.

LONG ISLAND. Largest island of the continental United States, Long Island in New York State has a population exceeded by only seven of the states. Its great center Brooklyn is part of New York City. Most other places are suburbs, growing swiftly to ease the pressure of population in the metropolis. In one new town, more than 15,000 homes were built between July 1947 and March 1951. Elsewhere huge apartment blocks sprang up to house as many as 12,000 people.

The island extends from the lower Hudson River about 118 miles northeast, roughly parallel with the Connecticut coast, from which it is separated by Long Island Sound. It is from 15 to 23 miles wide, has an area of 1,401 square miles, and a population (1950 census), of 5,237,918. (For map, see New York.)

A century and a half ago, Long Island was a region of farms, pasture, dunes, and fishing villages, except at the Brooklyn end. Sag Harbor and the towns called "The Hamptons" were whaling ports. Blue Point was an oyster center, and oyster farms spread to other bays. The building of ships and boats was among the earliest industries.

The construction of rail lines, begun in the 1830's led to rapid changes in the island. The western counties, Kings (coextensive with Brooklyn) and Queens, were absorbed into New York City and became a great industrial center (see Brooklyn). Nassau County grew to be a region of suburban homes. Suffolk County came to be noted for its summer resorts and for farms raising vegetables and poultry—notably potatoes, cauliflower, and Long Island ducklings. In recent decades a network of highways, bridges, and tunnels to New York City have speeded the huge flow of traffic and stimulated the island's growth. New York's huge airports, La Guardia and International Airport, are here.

The island was formed in the Ice Age, when the glacier that covered New England pushed a moraine

into the ocean to rest on an underwater rocky ridge (see Ice Age). Tides and prevailing currents moved sand from the east end to form long spits along the south shore, with bays and lagoons inside. Here are the miles of sandy beaches that serve New Yorkers as a playground. The north shore's many bays and inlets on sheltered Long Island Sound make it ideal for boating. The countryside appears flat everywhere except on the gentle "backbone" down the middle. Scenic areas are preserved in 12 state parks.

The early inhabitants were Delaware Indians, whose names remain in many geographic features of the region. Giovanni da Verrazano saw the island in 1524 and Henry Hudson landed on it in 1609. Four years later Adriaen Block explored the north shore. The Dutch named the island and claimed it. It became part of New York when the English captured New Amsterdam in 1664.

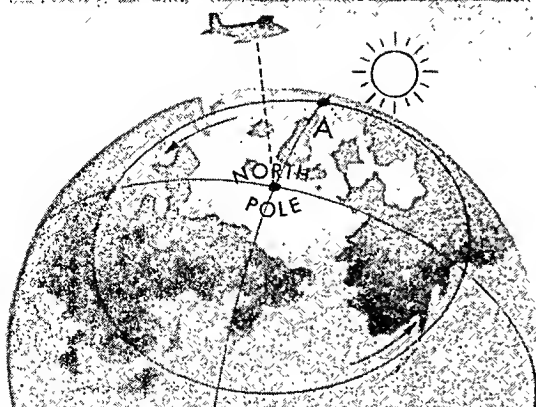
The battle of Long Island, Aug. 27, 1776, was fought on Brooklyn Heights, which had been fortified by the Americans as part of the defense of New York. The British under General Howe, outflanked the colonial troops and drove them from the field.

LONGITUDE. The lines of longitude are imaginary half circles running north and south from pole to pole over the face of the globe. By counting from one to another we can determine distances and give locations east and west around the earth.

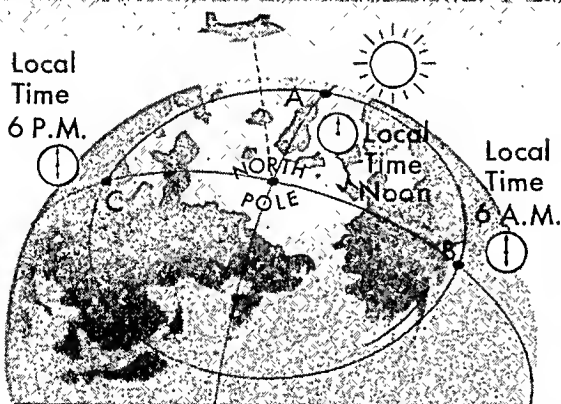
These north-south lines are called *meridians*. The name comes from two Latin words, *medius* and *dies*. Together the words mean "middle of the day." The Romans gave the lines this name because at noon in any locality the longitude line for that locality pointed directly toward the sun.

The longitude lines, with their companions the latitude lines, give geographers a way to fix locations and determine directions and distances over large areas of land and sea. The system is explained

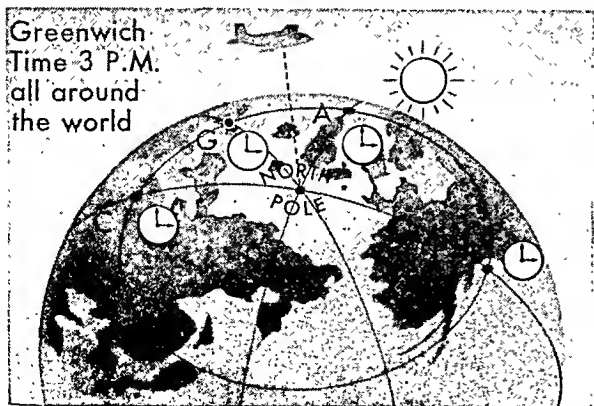
THE TIME OF DAY TELLS LONGITUDE



If we could hover over the North Pole in some sort of space ship, we would see how the earth rotates from west to east once every 24 hours. So point A would rotate through 360 degrees in 24 hours, 90 degrees in six hours, and 15 degrees in one hour.



Now notice points A, B, and C spaced around half of the earth. At A, the sun is south and the time is noon. At B, the sun is rising (at 6:00 A.M.); at C, it is setting (at 6:00 P.M.). These hours are called the local times for each place. If navigators at A, B, and C could compare their local times at the same instant, the difference in time would tell them how far apart they are from each other around the earth.



Navigators cannot use the method suggested above, of comparing local time with each other. Instead, they compare their local times with the time of one place (Greenwich, England) which they carry with them on chronometers. In the diagram, Greenwich is marked G, and the time there is 3:00 P.M. This time is repeated at A, B, and C, as it would be on navigators' chronometers. But the local time at A is noon. Since the Greenwich time is 3:00 P.M. the navigator at A is three hours away from Greenwich. The earth rotates 15 degrees every hour, and so he is also 45 degrees west of Greenwich, or at 45° W. longitude. You can do this for points B and C by comparing the times shown in this picture with the one above it.

in the article on Latitude and Longitude. How men use the system for finding locations is explained in the article on Navigation.

Learning to fix latitude has always been easier than learning to fix longitude. Since ancient times, men have found latitude by observing the height of the Pole Star or the noon sun (*see* Navigation). But they could not use the sun or stars to find longitude because these heavenly bodies all move across the sky and present the same appearance to every place in the same latitude at some time in the 24 hours. But finally men learned how they could use the time of day in each locality to tell longitude.

How the Time of Day Gave an Answer

Even the cave men probably divided the day into dawn, noon, and twilight, according to the daily movement of the sun. Gradually men began to see that the time in their locality, as judged by the sun, would be different than time for men who lived to the east or west. As dawn appeared in one place, it would still be dark somewhere to the west. When twilight came, it would still be light farther west. And so men began to realize that a connection exists between time and east-west distances.

The accompanying pictures show how navigators, map makers, and explorers use this connection to determine longitude. Imagine that you are high in a space ship above the North Pole and are looking down upon the earth with a very powerful telescope. The first thing you would notice is that the side of the world facing the sun is lighted. The other side of the world is covered with darkness. In other words, it is day in one half of the world and it is night in the other half.

Then pick out a man on the earth somewhere to your right and watch him move from right to left. He moves because the earth rolls from west to east at a steady speed. It makes a complete rotation in one day, or 24 hours.

When the man was to your right, his location was just beginning to come into the lighted area. It would be sunrise here, at (in the spring or fall) about six o'clock in the morning. At another place, in the center of the lighted half of the earth, the sun is shining directly down. Here the time is noon. To your far left, another place is just going into the shadow of twilight. For this place the sun is setting, and it is about six o'clock in the evening.

The first picture shows that the rotating earth will take a man from the right to the left of the lighted half of the earth in 12 hours. So 12 hours in time corresponds to half way around the world in distance. When we say distance, we mean distance in "amount of turn," and not in miles. Distance in miles changes according to the latitude. At the equator a degree of longitude equals 69.17 statute miles. Halfway between the equator and the pole, at 45° N. or S. latitude, it equals 49 miles. At the pole it shrinks to nothing. (A table showing distance in miles for a degree of longitude at various latitudes is given in the article on Latitude

and Longitude.) The amount of turn is measured in degrees because measurement in degrees is the same at all latitudes. By this method, 12 hours corresponds to 180 degrees. In one hour the earth turns 15 degrees.

Time and Longitude

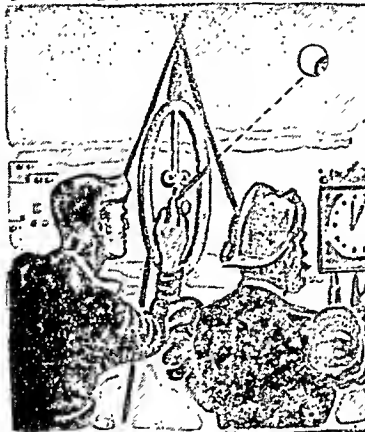
Suppose now that people in various places could compare their times by radio. They could then learn their distances from each other. For example, a man in Chicago learns that it is 5:00 P.M. in New York, while his own time is 4:00 P.M. He knows then that New York City is about 15 degrees east of Chicago. At the same time, he may hear a radio announcer say, "It's 2:00 P.M. here in Los Angeles." The Chicago man could easily figure that Los Angeles is about 30 degrees west of Chicago. Similarly, men anywhere can learn the longitudes of distant places by knowing their times. This works well as long as we can compare time instantly with distant parts of the world. But in early times, men had no radio or any other convenient way to compare time over great distances.

In the 2d century B.C. the Greek astronomer Hipparchus suggested that if men in various places noted the time when the sun went into eclipse, each of them would be checking his time at the same instant. Then they could compare the times in different localities by letter. But to make the method work, they had to know the time accurately in each locality; and they had no clocks or other timekeepers good enough to give satisfactory results. A few tried to fix time by measuring the position of the sun in its daily course; but their crude instruments gave poor determinations. So the method remained just an interesting theory until the late Middle Ages, when clocks were invented (see Watches and Clocks).

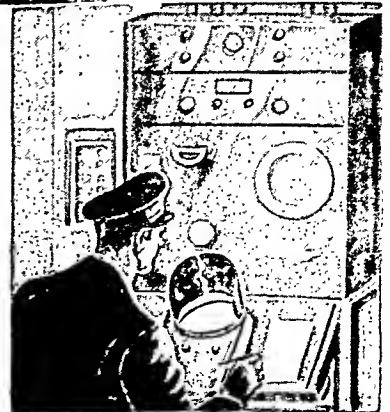
Even then, men had trouble learning to calculate longitude, because the clocks were not reliable. In 1577, for example, Philip II of Spain ordered a solar eclipse timed from several places in Central and South America. This observation fixed a few longitudes in the New World and they were put on maps. But some of the longitudes were wrong by even hundreds of miles.

From the relation between longitude and time, we can see why errors could be large. The earth measures about 25,000 statute miles around the equator, and

HOW MEN ATTEMPTED TO FIND LONGITUDE THROUGH THE AGES



Here we see how men in various ages tested time to find their longitude. First, an ancient Greek astronomer measures the height of the sun during the start of an eclipse to check the time. Second, Spanish sailor-astronomers make the same time test with an astrolabe. Third, Capt. James Cook takes a "lunar" sight with a sextant. Last, a present-day naval officer determines longitude with a radio time signal.



this distance in miles corresponds to 360 degrees of longitude. Places on the equator must move a little more than 1,000 miles an hour, or about 17 miles a minute, in order to make the turn in one day. So an error of only a few minutes in time can make a large error in fixing distance and longitude.

By the 18th century men had developed the "lunar" method of learning time and longitude. This was a long, hard calculation based on the eastward movement of the moon past the stars (see Moon). It was so difficult that only skilled navigators like Captain Cook were able to use it (see Cook). It also often went wrong, for a small error in observation caused a large error in calculating longitude.

In 1714 the British Admiralty offered a prize of £20,000 for a timekeeper that would remain accurate throughout long voyages at sea. Some

years later John Harrison of London invented a special kind of clock called a *chronometer*. After constructing several models, he submitted one for the prize. It was carried on a voyage to Jamaica, and when the ship returned, the chronometer had lost less than two minutes. The prize was awarded to Harrison in 1765. In the same year Le Roy of Paris constructed an even more accurate model of the chronometer. From then on, men have had no trouble in determining longitude by time comparisons. Navigators now carry the time of the

Greenwich meridian at 0° longitude on their chronometers for determining longitude anywhere (see Time). Comparing local time with Greenwich time gives them their longitude. Radio time signals enable navigators everywhere to check their chronometers for accuracy daily.

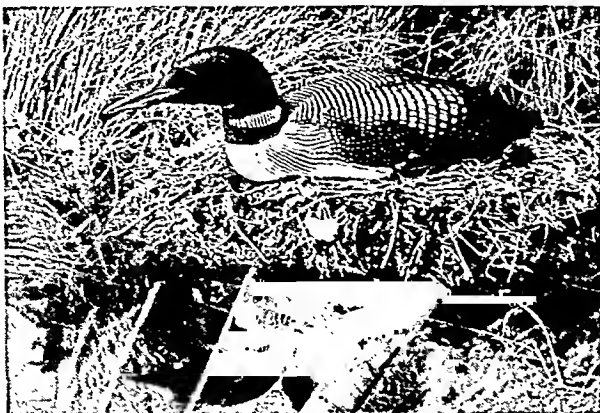
LOON. "As crazy as a loon" is a significant expression to anyone who has heard the uncanny laughter-like notes which the common loon sends ringing across the waters of North American inland lakes. This bird and three other species make up the family *Gaviidae*.

During the nesting season they inhabit freshwater lakes and ponds, but in winter they cruise the seas and large lakes, often living 50 or more miles from land. Because their webbed feet are set far back on the body, they are clumsy creatures on land, wobbling along with the assistance of their wings and bill. Although they have some difficulty in rising from the water, they are strong fliers. Fishes, frogs, and aquatic insects form their chief food. Their nests, with two brown eggs, are usually roughly fashioned near the water. The parents are remarkably affectionate, swimming about in company with their young, and carrying them on their backs when they grow tired.

The common loon is about 32 inches in length. In summer its plumage is a beautiful black spotted and

barred with white, shading to pure white beneath. In winter the upper parts are blackish without white spots. It breeds from Labrador, Newfoundland, Nova Scotia, and Maine south to northern Illinois, and winters from the Great Lakes south to Florida and the Gulf coast.

A COMMON LOON ON ITS ROUGH NEST



The loon is so clumsy on land that usually it builds its nest in the mud at the water's edge, as you see here. Then it can slide readily from the nest into the water and get back easily.

The red-throated loon, a smaller species about 25 inches in length, visits the United States only during the winter, when it frequents both the Atlantic and Pacific coasts. The plumage of the back, wings, and tail is a dusky brown slightly spotted with white. Its name is derived from its chestnut-colored foreneck. The Pacific loon has black upper parts with a band of white streaks on the throat. This

species is found in the United States mainly in winter, when it ranges along the Pacific coast from southern Alaska to southern Lower California.

The loons form the order *Gaviiformes*, or birds of diving type. Scientific name of common loon, *Gavia immer*; of Pacific loon, *Gavia arctica pacifica*; of red-throated loon, *Gavia stellata*. Some classifications use the generic name *Columbus*, of the grebes, for loons.

The CITY MADE GREAT by both CHARM and INDUSTRY

LOS ANGELES, CALIF. On the sun-drenched Los Angeles plain, between the San Gabriel Mountains and the Pacific Ocean, lies one of America's fastest-growing cities. Fourth largest in population and fifth in industrial importance, it covers the greatest area of any city in the country (453 square miles).

It thrusts a finger nine miles long and half a mile wide down to the coast to include within its corporate limits the towns of San Pedro and Wilmington which comprise Los Angeles Harbor. For this is also one of the nation's leading seaports with a large and growing oriental and coastwise trade. It reaches 40 miles inland to the desert slopes of the mountains, and up brushy canyons inhabited only by coyotes, rabbits, and gray foxes. It includes within its limits 212 square miles of the San Fernando Valley's irrigated orange groves and truck farms, and some of the richest oil fields in the world. In its swift expansion it has overtaken and surrounded many cities which still retain their independence—Santa Monica, Culver City, San Fernando, Glendale, Burbank, Beverly Hills. Others, like Pasadena, fit into the borders of its ragged outline like the pieces of an uncompleted jigsaw puzzle.

A Leading Manufacturing Center

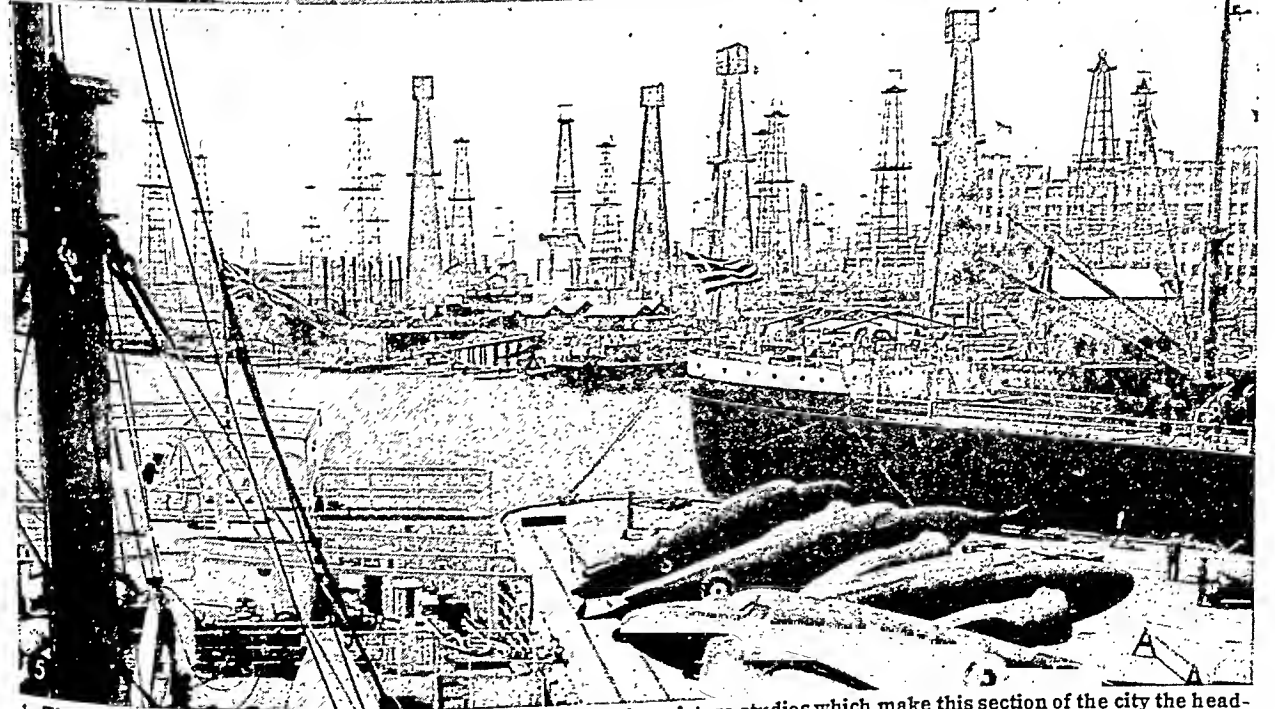
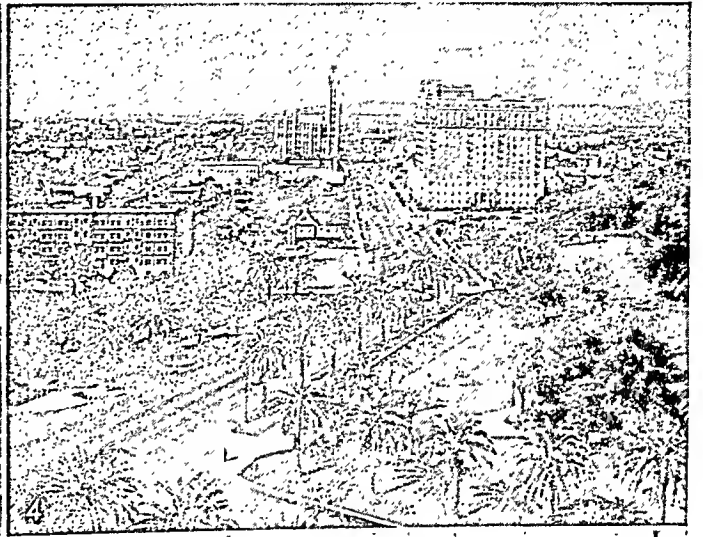
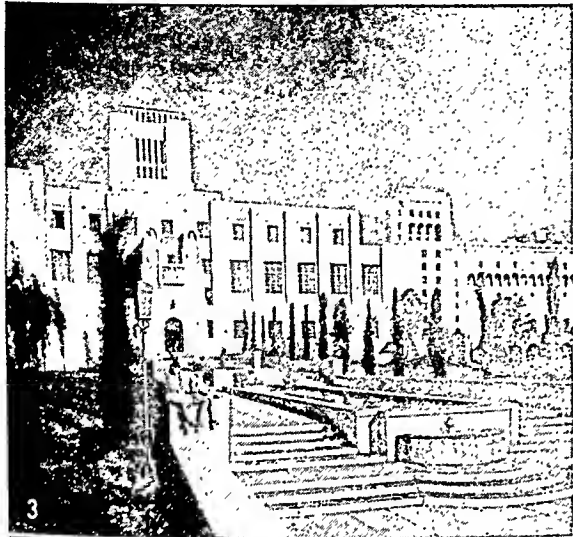
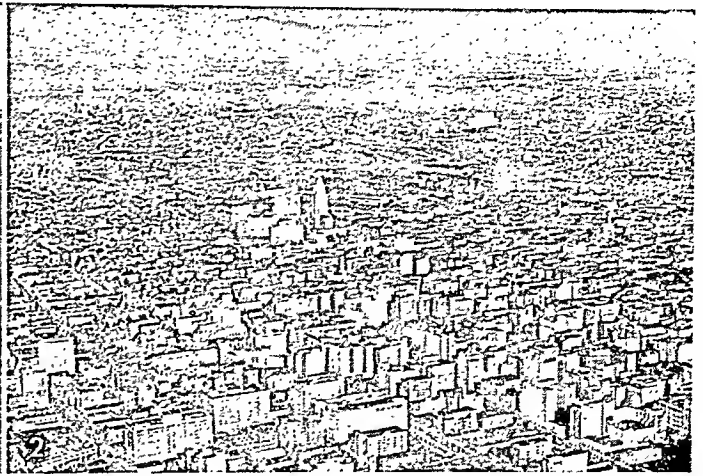
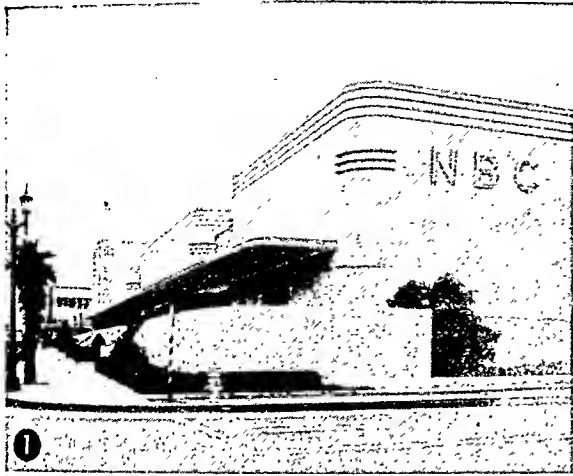
Once famous for sunshine and scenery, oranges and roses, freak architecture, and bizarre costumes, Los Angeles has outgrown some of its youthful oddities

and has earned a substantial place in the nation's industrial and cultural life. The motion picture industry settled here about 1910, drawn by the variety of scenery and the prevailing clear weather. Now that most films are made in sound-proof enclosures, these factors are no longer so important, but the industry has continued to grow. Hollywood, the traditional name of movieland, is not a suburb, but a section of the city. The suburbs of Culver City, Universal City, and Burbank also have large studios. Many of the film stars live in the suburb of Beverly Hills. Radio broadcasting, television, and phonograph recording have also flourished in this great center of entertainment.

In the manufacture of aircraft the Los Angeles area leads the world. Like the "movies," the industry was first attracted to southern California by sunshine—"350 flying days a year." During the second World War it grew enormously.

Los Angeles assembles more automobiles than any other city except Detroit. It makes almost as many rubber tires and inner tubes as Akron, and more furniture than Grand Rapids. It ranks third in food processing, third in oil refining, and makes more oil-well machinery than any other city in the country. In the manufacture of women's clothing it is fourth. Tourists spend \$200,000,000 annually in Los Angeles, and catering to their needs is a major industry.

SCENES IN SUNNY LOS ANGELES



1. The NBC building in Hollywood, one of many radio and moving-picture studios which make this section of the city the headquarters of the nation's entertainment industry. 2. An air view of the city looking northeast, with the 32-story City Hall dominating the Civic Center. 3. The beautiful Public Library. 4. Wilshire Boulevard, one of the principal uptown business districts with Lafayette Park in the foreground. 5. The Wilmington section of Los Angeles Harbor bristling with oil derricks.

The harbor, 20 miles from the Civic Center, was originally an unprotected seaway rimmed by mud flats. Between 1910 and 1914 the city annexed the sleepy little coastal villages of San Pedro and Wilmington, and with the aid of the Federal government, built one of the world's largest man-made harbors. A great breakwater enclosed a roadstead where ships safely rode at anchor. The dredging of channels and slips made an inner harbor with miles of water front and hundreds of acres of reclaimed land on which stand terminals, warehouses, and shipyards. The harbor merges with that of Long Beach. Here is one of the nation's "free ports" where imports may be stored duty free. Its annual commerce totals hundreds of millions of dollars from incoming tin, lumber, sugar, coffee, and bananas and outgoing crude and refined petroleum, aircraft, raw cotton, canned fish, citrus fruit, and other products.

The Arrangement of the City

The original heart of Los Angeles was the Plaza, laid out as a Mexican pueblo in 1781. This is still the center of the large Mexican population. Avila Adobe, on Olvera Street, is the oldest house in the city, built between 1818 and 1824. Olvera Street is gay with Mexican shops and restaurants and Mexican festivals are celebrated here and in the Plaza. Almost as colorful is New Chinatown a few blocks to the northwest. Of modern oriental architecture, with landscaped courts and narrow arcades, it grew up when old Chinatown was razed to make room for the giant Union passenger terminal east of the Plaza.

The new Civic Center is south of the Plaza. It includes the 32-story City Hall, the Federal Building, County Hall of Justice, County Hall of Records, and State Building. Several others will eventually be erected, and landscaped parkways will replace the old streets and buildings now lying between the Civic Center, the Plaza, and the Union terminal.

High-speed arterial highways radiate from the downtown section. Along their course have grown up many business and industrial districts more or less independent of the city's heart. The public transportation system is inadequate to link these conveniently, but most of the people own automobiles and need roads rather than public transport.

Wilshire Boulevard runs west to the ocean at Santa Monica, 17 miles distant. Many of the large shops and department stores have moved to the five-mile section between MacArthur (formerly Westlake) Park

and Fairfax Avenue. In Hancock Park, on this boulevard, are the famous La Brea Pits, asphalt bogs which trapped such prehistoric animals as saber-toothed tigers, mastodons, and giant sloths and preserved their skeletons.

Northwest of the Civic Center lies 4,253-acre Griffith Park, the nation's largest municipal park. It includes an observatory, a planetarium, and a zoo.

The University of Southern California is southwest of the Civic Center. Near by is Exposition Park. It contains the State Exposition Building, the Memorial Coliseum, swimming stadium, and Los Angeles County Museum of History, Science, and Art, which houses the animal remains found in the La Brea Pits.

Educational and Cultural Opportunities

Young people in Los Angeles have every educational advantage. After secondary school they may take their choice of the University of Southern California, the University of California at Los Angeles, the Los Angeles City College, Loyola University of Los Angeles, Occidental College, George Pepperdine College, Chapman College, Immaculate Heart College, and Mount St. Mary's College. The Chouinard and Otis art institutes offer courses in fine and commercial arts. In nearby Claremont are Pomona College and Scripps College. The California Institute of Technology at Pasadena is a

leading scientific and technical school. There are many colleges in neighboring communities also.

Students of the arts delight in the rare manuscripts, books, and paintings of the Henry E. Huntington Library and Art Gallery at San Marino. The Philharmonic Orchestra plays in its own auditorium in the winter; in the summer it presents its "symphonies under the stars" in the Hollywood Bowl. Grand Opera is presented in the Shrine Civic Auditorium.

Los Angeles people have many places to go for recreation. Within easy driving distance are miles of ocean beaches, and up in the mountains winter sports are enjoyed during the winter season. At Santa Catalina Island, 25 miles out from Los Angeles harbor, one can see strange submarine gardens through glass-bottomed boats or watch seals on the rocks. Sportsmen come here to angle for fish. The old San Fernando, San Gabriel, and San Juan Capistrano missions attract many visitors. Near by are the world's largest telescopes in observatories at Mount Palomar to the south and Mount Wilson near Pasadena. Of the many flower festivals, Pasadena's Tournament

FACTS ABOUT LOS ANGELES

Population: 1,970,358 (1950 census); metropolitan area, 4,367,911. Growth of city: 1850, 1,610; 1870, 5,728; 1890, 50,395; 1900, 102,479; 1910, 319,198; 1920, 576,673; 1930, 1,238,048; 1940, 1,504,277.

Area (Land): 453 square miles; of metropolitan district, 4,866 square miles.

Climate: *Average Temperatures*—highest monthly average, 71.5°F. (Aug.); lowest monthly average, 55.5° (Jan.); annual average, 63°. *Precipitation*—annual average, 15.24"; monthly high, 3.27" (Feb.); monthly low, .01" (July). *Sunshine*—Percentage of possible sunshine, 72.

Principal Water Shipments: *Exports*—Crude petroleum and refined petroleum products, aircraft, raw cotton, canned fish, citrus fruits. *Imports*—Sugar, bananas, tin, coffee, rubber, raw silk, lumber. *Coastwise*—Fish, lumber, crude petroleum, canned goods, cotton.

Principal Manufactures: Refined petroleum, oil-well machinery and tools; aircraft, parts, and engines; canned fish, meats; motion pictures, ships, automobiles, tires and tubes, furniture, women's clothing, chemicals, metal products.

of Roses on New Year's Day is the most spectacular. Its climax is the intersectional football game in the Rose Bowl.

From Sleepy Pueblo to Boom Town

Los Angeles was founded in 1781 by the Spanish governor of California, Felipe de Neve. Eleven families of Mexicans, Indians, Negroes, and half-breeds captured the Indian village of Yang-na and renamed it *El Pueblo de Nuestra Señora la Reina de Los Angeles de Porciuncula*—the Town of Our Lady Queen of the Angels of Porciuncula (a chapel in Italy beloved by St. Francis). Under later Mexican rule it was now and again the capital of California. Commodore Robert F. Stockton and Gen. John C. Frémont raised the American flag over the town in 1846 during the Mexican War. The people revolted, but Stockton and Gen. Stephen Watts Kearny took the village again in 1847. The hamlet got its city charter in 1850.

Adventurers from the San Francisco gold rush moved south to Los Angeles and made it a lawless cow town popularly known as "Los Diablos." The Southern Pacific Railroad planned to leave Los Angeles off its track entirely in the middle seventies, and went in only after the eager citizens had made valuable concessions to the transcontinental road. The Santa Fe line, which arrived soon after, had a rate war in 1885 with the Southern Pacific that cut the round-trip fare from St. Louis and Chicago to Los Angeles to \$15. Middle Westerners poured into the city. When the boom collapsed in 1888 most of them returned home—paying full fare.

In 1892 oil was discovered and a new boom was on. By now, the great fertility of the semiarid plain was also discovered, and with irrigation began the development that was to make this the richest agricultural county in the United States. Unless the town were to remain a dead end, two things were necessary—water to supply irrigation and the needs of a rapidly growing population, and a harbor to ship oil and the fruits and vegetables of the county. With the help of the Federal government, the harbor was opened in 1914. From 1907 to 1913 Los Angeles built an aqueduct 233 miles long at a cost of \$24,500,000, in order to pipe the entire flow of the Owens River into the county. Still the city grew and the need of water grew with it. In 1941 the 242-mile Colorado River Aqueduct was completed, bringing water from Parker Dam, 155 miles below Hoover Dam, to Lake Mathews (see Aqueducts).

With water for its crops and a harbor from which to ship them the city gained a quarter million in population between 1910 and 1920. Moving pictures,

oil, tourists, and many new manufacturing industries added more than half a million in the next decade. The economic depression of the 1930's slowed but by no means arrested the city's growth. During the second World War about 300,000 more poured in. By 1950 the city had grown to almost 2,000,000. It had multiplied some 19 times since 1900. Many people from the Middle West have come to the city. Mexicans make up a large part of the foreign born among the population.

The city is governed by a mayor, city council, and commissions appointed by the mayor. City laws provide for the initiative, referendum, and recall, and for control of finances through an executive budget.

LOTUS. In the *Odyssey*, Homer tells us that the magical lotus fruit caused those who ate it to forget country, friends, and home. The expression "lotus-eaters" has therefore come to mean dreamy indolent persons who have lost contact with reality. We usually associate the word with the blue Egyptian lotus, or the sacred pink lotus of the Chinese, Japanese, and Hindus. To the ancient Greeks the lotus probably meant a prickly shrub (*Zizyphus lotus*) with a sweet mealy fruit, which is still eaten in some Mediterranean districts.

The American lotus (also called the yellow water lily, water chinquapin, or nelumbo) is a magnificent water lily found locally from southern Ontario to Texas and Louisiana. It is especially abundant in the Mississippi and Missouri rivers, and at Grass Lake, in northern Illinois. The plants form a dense tangle of giant circular leaves up to 30 inches across, raised on strong stems two to six feet above the water. The flowers, which open in August, are a pale sulphur-yellow; they measure 4 to 10 inches from tip to tip of the outspread petals. The Indians were fond of the edible rootstocks and seeds. Perhaps the wide distribution of the plant may be due to Indian traders who carried the seeds through the country.

In art and architecture the lotus, in conventionalized designs, is a common ornament. This design

originated in Egypt, where it was used on the capitals of columns, and in India and China, but frequently appears in modern European and American art.

The lotuses belong to the water-lily family *Nymphaeaceae*. The American lotus (*Nelumbo lutea*) is closely related to the pink East Indian lotus (*Nelumbo nucifera*). The Egyptian lotus of the Nile River belongs to a related genus *Nymphaea*. *Nymphaea lotus* has white or rose petals; *Nymphaea coerulea* has blue petals. The Egyptian and the East Indian plants have both been naturalized in the United States. Lotus is also the name of a genus of the pea family (*Leguminosae*), of which the bird's-foot trefoil, *Lotus corniculatus*, a small perennial herb, is the most widespread.

THE AMERICAN LOTUS



The American lotus, or nelumbo, spreads a luxuriant carpet of glossy-green leaves and large yellow blossoms over ponds and lakes of the eastern United States. Like the sacred lotus, it is a water lily.

LOUIS—A ROYAL NAME in France for 13 CENTURIES

The Story of a Long Line of Rulers, Good and Bad—Louis the Fat, Who was Great as a Fighter, a Hunter, and an Eater; a Saintly King, and a Crafty One; the "Grand Monarch"; the Weak Louis Who Lost His Head, and Many Others

LOUIS, KINGS OF FRANCE. CLOVIS (or Chlodowech), the founder of the kingdom of the Franks, 481-511, may be considered the first of the numerous French kings to bear the name of Louis. In after

LOUIS "THE SAINT" HONORED BY HIS FOES



A king whose religion was his life, it is not surprising that Louis IX should have been one of the leaders in the Crusades. Captured by the Saracens in 1250, he was released after paying a heavy ransom. During his captivity, however, he won the admiration of his enemies by his dignity and honorable conduct. Here we see the Saracen chiefs paying homage to him at the door of his prison tent. But this tribute to his character was all that his effort finally won, for the Crusade was an utter failure.

years the "C" was dropped, and the "v" was written as a "u," thus making our modern name of Louis. It is the same as the English Lewis and German Ludwig. But the Louis who is usually reckoned as Louis I of France was the son of Charlemagne and followed his father as king and emperor. He is called **LOUIS THE PIOUS** and ruled from 814 to 840. The next four kings of this name in the Carolingian line left too little mark on the course of history to deserve mention here.

LOUIS VI, "the Fat," 1108-1137, was the first important king of the Capetian line. This line sprang from Hugh Capet, who became king in 987. Louis the Fat was a great fighter, a great hunter, and a great eater, and at 46 he became too fat to mount a horse. But he remained the embodiment of warlike energy. His great task was to reduce to order the petty nobles of the royal domain, who were truly "robber barons." When Louis came to the throne every lord of a castle robbed at will, and it was not safe for even the king to pass along the road. Twenty years of hard fighting were necessary to remedy this condition, but in the end the king triumphed, and law and order prevailed. In order that such evils might not recur, every castle that was captured was destroyed or given to faithful followers.

LOUIS VII, 1137-1180, son of Louis VI, is remembered for two events. He led the fruitless Second Crusade (1147-49) and he caused the annulment of his marriage to Eleanor of Aquitaine. Eleanor then

married Henry II of England. Thus the duchy of Aquitaine in southern France, the dowry of Queen Eleanor, passed from the possession of the king of France to his rival, the king of England. Louis VIII, 1223-26, the son of Philip Augustus, reigned too short a time to accomplish anything of great importance.

LOUIS IX, 1226-1270, called "Saint Louis," is perhaps the most heroic and popular one in the whole procession of French monarchs.

He was the dutiful son of Louis VIII and his queen, Blanche of Castile, and in his education the rod had not been spared; his widowed mother often told him that she would rather see him dead than have him commit a

mortal sin. She herself was a remarkable woman, who during her son's minority dauntlessly faced the numerous revolts of the turbulent nobles. In her son she was fortunate, for he possessed all the good qualities and few of the bad ones of the age in which he lived; indeed, his virtues were so remarkable that after his death the church declared him a saint. His acts of piety, however, such as wearing a hair-cloth shirt, fasting, and waiting on lepers, were usually performed in private. To the world he was a fearless knight, thoroughly trained in the art of war; a conscientious, just, and able king, who was usually good-

humored and kindly, but at times became impatient and angry; and a powerful ruler, who greatly strengthened the royal power. He improved the government by appointing local officials who were responsible to him for the administration of justice, the collection of taxes, and the government of their districts. He

encouraged the people to appeal to him if the nobles oppressed them or his officials were unjust. He also improved the administration of justice by abolishing trials by combat and by using in his courts the new lawyers trained in the Roman law, in place of the churchmen who, formerly, alone could read and write. These reforms not only benefited the people but they checked the power of the quarrelsome nobles, who, according to a writer of the time, "undertook nothing against their king, seeing clearly that the hand of the Lord was with him." Saint Louis made two crusades—one to Egypt and the Holy Land (1248-54), on which he was captured and held to ransom by the Mohammedans; and the other to Tunis, in 1270, where he died of the plague.

Louis X ruled for but two short years, 1314-1316.

Louis XI, 1461-1483, presents a striking contrast in character to Louis IX. In appearance Louis XI was "ugly and unkingly"; in character he was unscrupulous and underhanded—a man of the Renaissance, and like his contemporaries, Caesar Borgia and Richard III, an embodiment of the principle which we call Machiavellian. He firmly believed that "he who has success has honor," and he cared nothing for the way in which he attained the success. He made promises only to break them, unless he had sworn by one particular saint—then his word was good. His one ambition seemed to be to extend the boundaries of France, and although he was too stingy to buy a new hat to replace the shabby old one he wore, he spent large sums in buying back border cities. In his conflicts with the nobles, especially with Duke Charles the Bold of Burgundy, he also acquired much territory, so that by the time of his death most of the land of France had been brought

under the direct control of the king. The power of the crown in the latter part of his reign was truly absolute over the territory it held.

Louis XII, 1498-1515, is chiefly noted for the Italian wars, begun by his predecessor Charles VIII, and continued after Louis XII by Francis I.

WHAT A DISPOSITION!



An awkward, bony, ungainly creature with a long thin nose, Louis XI had a disposition as ugly as his looks. Thoroughly cynical and unscrupulous, he hesitated at no breach of honor to gain his ends. Around his shabby old hat he always wore lead images of saints, for he was pious—in his way.

Louis XIII, 1610-1643, has his chief claim to greatness in the fact that, in spite of all opposition, for 18 years he kept in power his able minister, Richelieu (*see* Richelieu, Cardinal). The first years of the reign were filled with anarchy and disorder, for the king was a child, and his mother, who ruled for him, was a weak and selfish woman. When Richelieu came into power, however, all this was changed. The Huguenots (*see* Huguenots) were reduced to a mere religious body, and the nobles were humbled. National unity and religious peace were secured at home, and the country was raised to the first position among the powers of Europe.

Louis XIV, 1643-1715, inherited this power, and carried it to yet further lengths. He was styled "the Grand Monarch," and

his brilliant court at Versailles became the model and the despair of other less rich and powerful princes, who accepted his theory of absolute monarchy (*L'état c'est moi*, "I am the state") and would gladly have imitated Louis XIV's luxury. Until 1661 the government was largely in the hands of the wily Italian, Cardinal Mazarin. But at his death Louis declared that he would be his own prime minister, and from then until the end of his reign he worked faithfully at "his trade of a king."

A passion for fame and the desire to increase French territory in Europe were the leading motives of Louis XIV. The latter led him to neglect the opportunities to gain an empire in America and India, and involved him in a series of wars which ruined the country financially and paved the way for the outbreak of the French Revolution.

His first war (1667-68) was an attempt to enforce flimsy claims to part of the Spanish Netherlands (Belgium). His second (1672-78) was directed against

"their High Mightinesses," the States-General of Holland, who had balked him of his prey in the first contest. In spite of the great military power of France, the Dutch admiral De Ruyter twice defeated the fleets of the French and their English allies, and Louis XIV failed ingloriously in his attempt to conquer Holland. The third war also (1689-97) was directed chiefly against Holland, whose "Stadholder" had now become King William III of England. The German province of the Palatinate was terribly wasted, but the Peace of Ryswick brought only slight gains for France. Louis' last and greatest effort was the War of the Spanish Succession (1701-13) in which the English Duke of Marlborough (see Marlborough, First Duke of) was the chief leader of the opposing European coalition. The right to seat his grandson Philip V on the diminished throne of Spain was small compensation for the thousands of lives and millions of treasure which the French king wasted in the struggle.

Millions more were spent by Louis in building the beautiful palace at Versailles, near Paris, and in maintaining his brilliant court. There etiquette "became the real constitution of France." It required seven persons, some of them the highest princes of the realm, to put the king's shirt on him at his getting up (*levée*) in the morning. A French historian says of Louis XIV: "He was a god in his temple, celebrating his own worship in the midst of his host of priests and faithful." This extravagance of the court meant a heavy burden of taxation for the common people, who were thereby reduced to a misery so great that three-quarters of a century later they rose up in rebellion and drove the Bourbons from the throne.

Louis XIV has the distinction of ruling longer than any other European king; for it was 73 years from the time when he ascended the throne as a child of less than five, until his death in 1715. He had outlived his son and his son, so that he was succeeded by his great-grandson.

Louis XV, 1715-1774. The luxury of the court of Louis XIV was continued under his weak successor,

who came to the throne at the age of five years. The evils from which the country suffered were clearly recognized, but the king when he grew up was too lazy and selfish to try to remedy them. Misgovernment was common at home, and the position of the country abroad was lowered by the loss of her colonial

possessions in India and America. These misfortunes, however, made little impression on the king or his courtiers, whose attitude was expressed in the phrase, "After us the deluge."

LOUIS XVI, 1774-1792. The storm broke in the reign of the just but irresolute Louis XVI. Awkward and timid, no man could have appeared less like a king than did Louis XVI, who was 20 years old when he came to the throne; and none could have seemed more out of place in the brilliant and polished court of which he was the center. Louis realized this himself, and often wished, even before the Revolution, that he were only a common man. He was a good horseman, fond of hunting, and delighted in making and mending locks. His greatest fault was that he was always ready to listen to and

follow the advice of others. When this advice was good all went well; but in the latter part of Louis' reign the advice was bad and it cost the king his life.

When he first came to the throne he entrusted the management of the finances of the kingdom to Turgot, one of the greatest of statesmen, and as long as the king followed his minister's advice, the state of the kingdom was improved. But he was more often under the influence of the beautiful but frivolous and extravagant queen, Marie Antoinette, and of the selfish courtiers. These all opposed any financial reforms which would threaten their "graft" and pensions and life of ease, and they soon persuaded the king to dismiss his able minister.

The Beginning of the Great Revolution

From this time on things went from bad to worse, and finally Louis XVI was forced to call the Estates-General, a body which had not met since 1614. Its meeting was the first step in the French Revolution (see French Revolution). The members of the third

THE "GRAND MONARCH" OF FRANCE



A magnificent creature, to be sure, this Louis XIV, the "Grand Monarch" in all the pomp of his royal robes! But the common people of France had to pay for all his magnificence in frightful burdens of taxation. And three-quarters of a century later another Louis paid with his life for the follies of his luxury-loving ancestors.

estate refused to follow the old method of voting, and finally declared themselves a national assembly.

At first the king seemed inclined to work with the Revolution and try to remedy conditions in the country. But the influence of the queen and of the courtiers proved too strong for his feeble will. Encouraged by them, he disregarded the promises he had made, and sought to flee from France that he might obtain aid against the revolution from Austria.

This attempted flight was the beginning of the end. The people saw that they could not trust the king and the "Austrian woman," as they called the queen. His disregard of his promises to abide by the constitution led to the storming of the royal palace of the Tuileries on Aug. 10, 1792. The king and his family escaped before the mob arrived and took refuge in the hall of the Legislative Assembly. That body declared the king was suspended from office and ordered that he and his family should be imprisoned. They then called a new assembly (the Convention) to decide whether France should continue to be a monarchy.

The convention first decided against a monarchy, and declared the king deposed. They then brought Louis XVI to trial on the charge of combining with foreign countries for the invasion of France. Almost unanimously Louis Capet, as he was now called, was declared guilty and was sentenced to death. The next day he was beheaded, meeting his fate with a steadfast courage, and proving greater in death than he had ever been in life. His son, the little Dauphin, who soon perished mysteriously in prison, is counted as Louis XVII, although he never ruled. The execution of Louis XVI had important consequences for France, for it aroused opinion in other countries against the French Revolution.

Louis XVIII, 1814-1824. When the Bourbons were restored to the throne of France by the Allies in 1814, the younger brother of Louis XVI assumed the crown as Louis XVIII. The difficult task of reconstruction was before the king, but he seemed

admirably adapted to meet the situation. He was cold-blooded and cared nothing for revenge, therefore he was satisfied to leave alone those who had driven his family from France. He was a lazy man, and his one ambition was to keep his throne. This ambition seemed likely at first to go unfulfilled, for in 1815

Napoleon returned from his island empire of Elba, and Louis XVIII fled in a panic from France. At the end of the Hundred Days, however, Napoleon was again overthrown, at Waterloo, and the Allies entered Paris, "bringing Louis XVIII in their baggage."

Until 1820 the king was able to resist the demands of the extreme royalists for vengeance, and to build up his kingdom, but finally under the leadership of his brother they became too strong for him. His yielding to their demands for a reactionary government marks the beginning of the end of the Bourbons, for 10 years later, under his brother, Charles X, they were driven finally from the throne of France.

LOUIS PHILIPPE, 1830-1848. Having disposed of the old Bourbons, the French had to set up a new government. Influenced by Lafayette (see

Lafayette, Marquis de), they decided to keep France a monarchy, with Louis Philippe, a member of the Orleans family related to the Bourbons, as king.

Louis Philippe was known for his democratic ideas, and was given the title of the "Citizen-king." He walked the streets of Paris alone, carrying a green umbrella and talking with strangers, and his children were sent to the public schools. But his government was undemocratic, and the people were not better off than before. Only the wealthy had profited by the Revolution of 1830. Demands for a more liberal government were refused by Louis Philippe, and his minister, Guizot.

When finally the government forbade a reform banquet which was to be held on Feb. 22, 1848, the Republicans of Paris revolted. Guizot was forced to resign, but this did not satisfy the rioters, and Louis Philippe abdicated on Feb. 24. Then he fled to England, where he died two years later.

"THE LOST DAUPHIN"



When his father, Louis XVI, was executed, the boy Louis Charles was placed in solitary confinement. Although the authorities claimed that he died there, many royalists believed that the dead child was a substitute, and that the real prince or "dauphin" had been spirited away. Although he never reigned he is known to history as "Louis XVII."

"CHILD of the MISSISSIPPI," Sunny LOUISIANA

LOUISIANA. At the mouth of the Mississippi River is the river's child, the state of Louisiana. Through geologic ages the river and its tributaries stripped material from higher land and carried it downstream. When the sediment-laden water reached the ocean it dropped its load. Thus Louisiana was built of deposits laid down by the river on the floor of the Gulf of Mexico since the days when the gulf extended up to where Cairo, Ill., now stands. And the river still builds up land at its mouth.

Rich soil is only part of the river's gifts to the state. The Mississippi and its branches give access by water for thousands of miles into the heart of the continent. Thus Louisiana stands as a gateway to a region vaster in extent and possibilities than any of those on which old-world empires were built. Its port, New Orleans, near the mouth of the Mississippi, looks southward over the "American Mediterranean." Through the port passes a large part of the trade between South America and the Mississippi Valley. New Orleans also exports a great volume of goods, particularly cotton, wheat, and petroleum, to Europe.

A Network of Waterways

From low plateaus and flat-topped hills, with an elevation of only 300 to 535 feet near the Arkansas line, the land slopes gently southeastward. The slope passes gradually through bluffs and prairies to the wooded swamps, "quaking prairies," and grassy marshes of the coast. The whole surface is fretted with waterways—rivers and sluggish bayous of secondary river outlets, bays, and lakes. Some bays are merely land-locked lagoons opening to the Gulf. Much of this is navigable water, except where choked with the water hyacinth and other vegetation. In fact, it is said that only four of the state's 64 parishes (counties) are without navigable water communication.

The rivers have built up their beds until they flow on the summits of low broad ridges. The highest portions of the alluvial lands on either side are the banks which the streams have built for themselves and often seek to overflow. The Mississippi, a capricious and dangerous benefactor, tries every spring to take back the lands which it has created. Hundreds on hundreds of miles of strong levees are required to protect the low-lying plantations and farms against it and against the Red and other large rivers.

A Picturesque Wilderness

Picturesque old cities, a brisk thrifty new towns, broad plantations, and prosperous little farms claim only a portion of the land. Along many a remote bayou, alligators and snakes still sun themselves peacefully on the knees of the ragged cypress, with its long beard of gray Spanish moss waving above the black water. The marshy coastal lands once were considered almost impenetrable and served as a haven for pirates, smugglers, and other outlaws. They are still a fragrant and flowery wilderness of grass, cane, palms, gum trees, and live oaks, a refuge for canvasback and other ducks, pelicans (Louisiana is called the "Peli-

can State"), and cranes. Although some marshy lands are being reclaimed for agriculture, Marsh Island off Vermilion Bay and some other wild tracts have been given to the state as a perpetual refuge for wild life.

Varied Agriculture of the State

Wonderfully fertile soil and virtually subtropical climate make Louisiana pre-eminently adapted to agriculture. Cotton, long the chief sale crop, still leads all other agricultural staples in value of production. It particularly dominates the region north of the Red River. Rice, sugar cane, corn, truck crops, and sweet potatoes are other leading crops. Milk, hogs, eggs, chickens, and cattle are also important.

Rice, a crop in which Louisiana leads the Union, is grown on the coast marshes and alluvial prairies in the southwestern part of the state. Until 1897 practically the whole crop was "Providence" rice; that is, rice grown by no other water supply than rainfall. Two years of drought caused a change in methods. Now rice is grown on what are known as "pump lands" by irrigation. Water is pumped up from bored wells into channels made by throwing up parallel dikes.

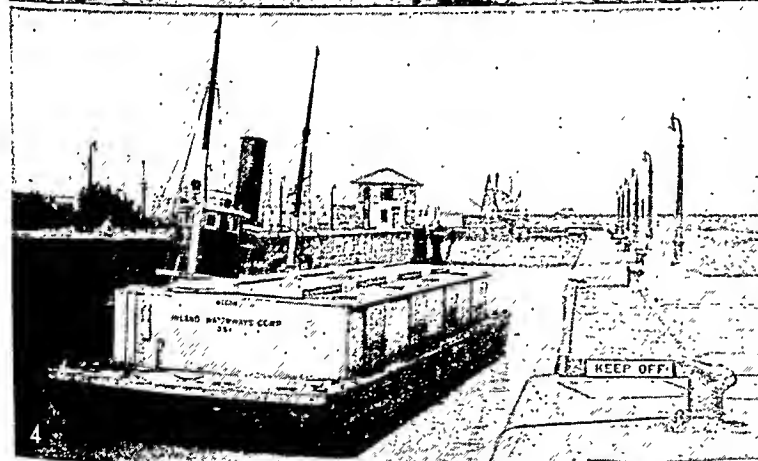
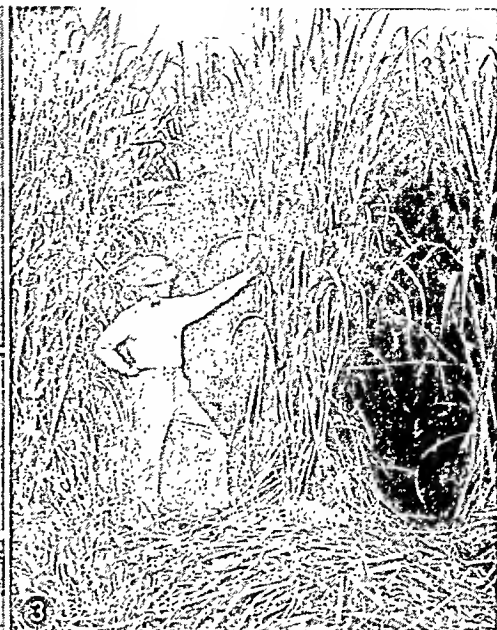
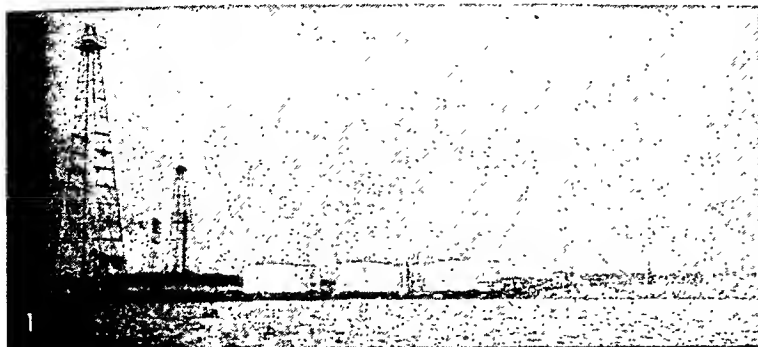
Corn can be grown anywhere in the state, and the yield on alluvial and reclaimed marsh lands runs as high as 100 bushels to the acre. Sugar cane, grown both for sugar and for syrup, is the specialty crop of Louisiana. The state produces more cane sugar than all the other cane-growing states of the Union. Sugar cane for sugar demands rich soil and rather expensive care. It is grown chiefly on large plantations and on alluvial and reclaimed marsh lands in the southern part of the state. Sugar cane for syrup is less exacting. It is grown farther north, on poorer soil, and by small farmers.

Art of Sugar Making Learned

The man who showed that good sugar could be made from Louisiana cane was the savior of the colony in the 18th century, when its then chief money-making crop, indigo, was attacked by a destructive worm. The Jesuit fathers had introduced sugar cane from Santo Domingo in 1742. But for many years the only sugar produced from the cane was a brownish, milky liquid suitable for rum making. Then in 1795, Étienne de Boré, experimenting on his plantation near New Orleans, succeeded in refining sugar by boiling the cane juice until it reached the granulation point. From then on the sugar industry became increasingly important. In 1927 mosaic disease threatened the sugar cane; but the industry was saved by importing from Java a cane which was able to resist the disease.

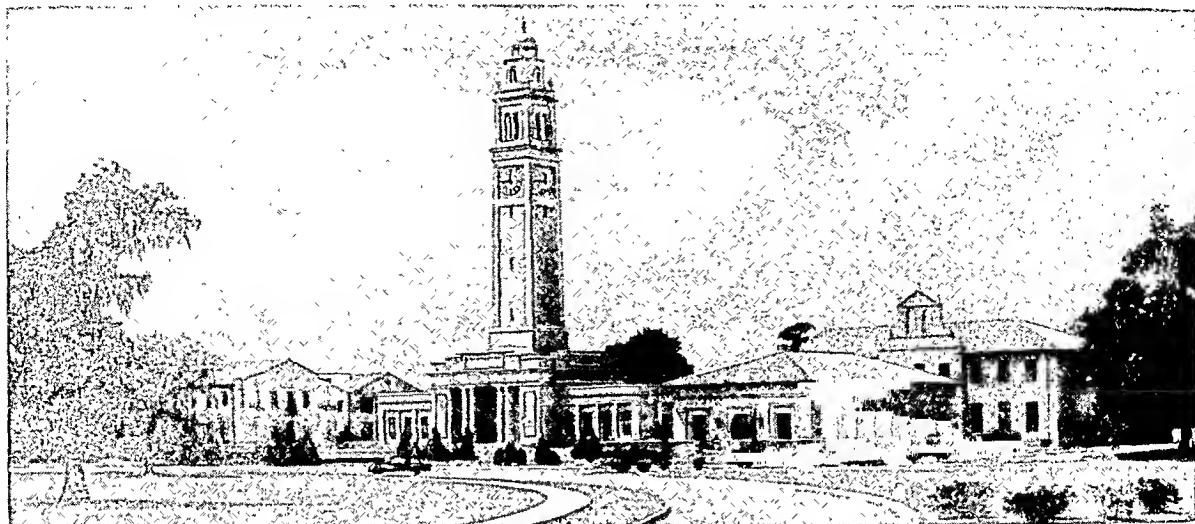
Louisiana leads all other states in the production of sweet potatoes, normally raising about 9 million bushels a year. Among the more important minor crops are hay; strawberries; oranges, and other subtropical and temperate zone fruits; and nuts, especially pecans. Louisiana has been called the "Holland of America," not only because of the importance of its dikes, but because of the prominence

LOUISIANA'S VARIED RESOURCES



1. Many of Louisiana's oil derricks stand in the water. Oil is pumped into tank barges for transportation to the refineries. 2. Lumber mills are the leading source of employment among manufactures. 3. In output of sugar cane, Louisiana leads the nation. 4. The Inner Harbor Navigation Canal is a "short cut" across New Orleans from the Mississippi River to the Gulf of Mexico by way of Lake Pontchartrain. 5. Rice is another crop in which the state leads the nation. 6. A net full of shrimp is dumped on the deck of a fishing boat. 7. These trappers are counting the pelts of muskrat caught in the bayous.

LOUISIANA'S STATE UNIVERSITY AT BATON ROUGE



The 4,725-acre campus of the Louisiana State University and Agricultural and Mechanical College lies along the Mississippi

for two miles. Here is its 175-foot-high War Memorial Tower, or Campanile, honoring Louisiana's dead of World War I.

of its truck farming. Tangipahoa strawberries, grown in the strip between Lakes Maurepas and Pontchartrain, are famous; cabbages are a specialty on the lower Sabine; tomatoes on the upper Ouachita, around Monroe; potatoes and cantaloupes in the northwest.

The famous perique tobacco, used for seasoning fancy blends, is grown on a little tract on the banks of the Mississippi, southwest of Lake Pontchartrain, and nowhere else in the world. Stock raising and woolgrowing have become increasingly important as the state has diversified its farming.

With all its advantages for agriculture, only about two fifths of Louisiana is in farms. There is a trend toward subdividing farms, and the average holding is about 90 acres. Yet there are still over a thousand plantations of more than a thousand acres each.

Other Natural Resources

The longleaf pine forests of the east and southwest, the shortleaf pine of the northwest, the cypress of the swampy lands in the south, and the hardwoods of the river bottoms support a vast lumber industry. In the damp forests Spanish moss is gathered in great amounts for mattresses, pillows, and upholstery.

Fish swarm in the Louisiana waters. The state leads all others in the production of shrimp. Its oyster, menhaden, catfish and bullhead, and crab catches are valuable. Louisiana is also the leading fur-producing state. Animals trapped include muskrat, mink, nutria, otter, raccoon, and opossum (see Furs).

Louisiana, along with Texas, produces nearly all the United States output of sulfur (see Sulfur). Louisiana's sulfur production is in Plaquemines Parish in the southeast. Salt is mined in great quantities near Vermilion Bay and is also found near the center of the state. However, the most important minerals are the natural gas, natural-gas liquids, and petroleum of northern fields near Shreveport and Monroe and in the Gulf of Mexico tidelands. Much of the nation's carbon black is obtained by burning the natural gas.

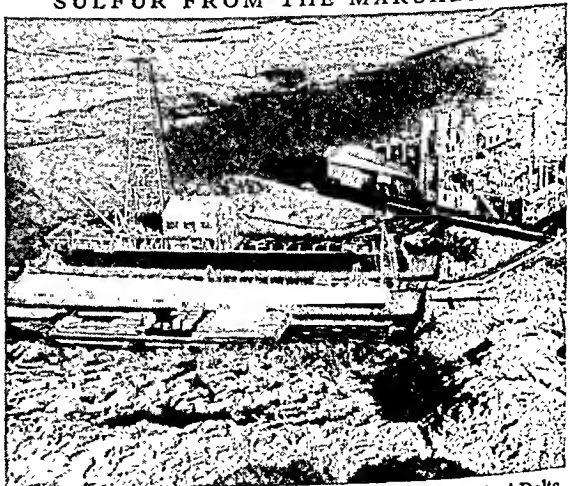
In recent years Louisiana has progressed greatly in manufacturing. The state's largest industry is the preparation of food products. This includes cane-sugar refining, rice cleaning and polishing, and the manufacture of many other food items. Petroleum refining and the manufacture of various chemicals are important industries. The state ranks high in timber products. One of the nation's largest sawmills, at Bogalusa, has a daily output of close to a million board feet.

Louisiana aids new and expanding industries with a ten-year exemption from certain taxes. In 1952 it created Louisiana's Industry Inducement Plan. This permits local governments to vote on issuing bonds for constructing and leasing industrial buildings.

Centers of Manufacturing

New Orleans, one of the world's greatest ports, is a manufacturing center (see New Orleans). Shreveport, in a great oil and gas field of the country, also

SULFUR FROM THE MARSHLANDS



This floating plant mines sulfur in the lower Mississippi Delta. It pumps molten sulfur into the insulated tank barges (at left), which transport it for storage 75 miles away.

Continued on page 333

Louisiana Fact Summary



LOUISIANA (La.): Means "Land of Louis." In 1682, La Salle gave name Louisiana to entire Mississippi Valley to honor Louis XIV of France.

Nickname: "Pelican State," from bird native to state. Also, "Child of the Mississippi River," because river silt built up the land along the river.

Seal: A pelican feeds its young. Above the bird are the words "Union, Justice," and below, "Confidence."

Motto: Union, Justice, and Confidence.

Flag: For description and illustration, see Flags.

Flower: Magnolia. Bird (unofficial): Brown pelican. Tree: None official. Song: 'Song of Louisiana', words and music by Vashti Robertson Stopher.

THE GOVERNMENT

Capitol: Baton Rouge (since 1849, but seat of government moved during Civil War to Opelousas, Alexandria, and Shreveport; returned, 1882).

Representation in Congress: Senate, 2; House of Representatives, 8. Electoral votes, 10.

State Legislature: Senators, 39; term, 4 years. Representatives, 100; term, 4 years. Convenes second Monday in May in even years; session limit, 60 days. Special session may be called any time.

Constitution: Adopted 1921. Amendments must be (a) passed by a two-thirds vote of legislature; (b) ratified by majority voting on amendment at an election.

Governor: Term, 4 years. May not succeed himself.

Other Executive Officers: Lieutenant governor, secretary of state, attorney general, treasurer, auditor, register of land office, commissioner of agriculture and immigration; all elected; terms, 4 years.

Judiciary: Supreme court—7 justices, elected by districts; term, 14 years. Courts of appeals—3; judges elected; term, 12 years. District courts—28 districts; judges elected; term, 6 years.

Parish: 64 parishes; 62 parishes each governed by a police jury of 5-16 members; 2 parishes (New Orleans and East Baton Rouge) governed by city-parish council and mayor; all elected, 4-year terms.

Municipal: Mayor-aldermen form most common; some cities have commission form of government.

Voting Qualifications: Age, 21; residence in state, 2 yrs.; in county, 1 yr.; in district, 3 mos. Literacy test required (or good character and understanding of government).



THE PEOPLE AND THEIR LAND

Population (1950 census): 2,683,516 (rank among 48 states—21st); urban, 54.8%; rural, 45.2%. Density: 59.4 persons per square mile (rank—22d state).

Extent: Area, 48,523 square miles, including 3,361 square miles of inland water area (30th state in size).

Elevation: Highest, Driskill Mountain, near Bienville, 535 feet; lowest, New Orleans, 5 feet below sea level.

Temperature (°F.): Average—annual, 67°; winter, 52°; spring, 67°; summer, 81°; fall, 68°. Lowest recorded, -16° (Minden, Feb. 13, 1899); highest recorded, 114° (Plain Dealing, Aug. 10, 1936).

Precipitation: Average (inches)—annual, 56; winter, 15; spring, 15; summer, 15; fall, 11. Varies from about 64 in the south to about 46 in northwest.

Natural Features: Surface low, with three great regions: coastal-delta, eastern uplands, western uplands. Bluffs along Mississippi flood plain. Marshes and thousands of shallow lakes and lagoons in fertile delta region. Principal rivers: Calcasieu, Mississippi, Ouachita, Pearl, Red, Sabine. Lake Pontchartrain, largest lake (1,125 square miles).

Land Use: Cropland, 13%; nonforested pasture, 14%; forest, 56%; other (roads, parks, game refuges, waste-land, cities, etc.), 17%.



Natural Resources: *Agricultural*—fertile, rich soil, adequate precipitation; almost every kind of crop can be grown. *Industrial*—petroleum, natural-gas liquids, natural gas, and sulfur. *Commercial*—good waterways on Mississippi and Red rivers; year-round tourist center, especially popular during Mardi Gras season.

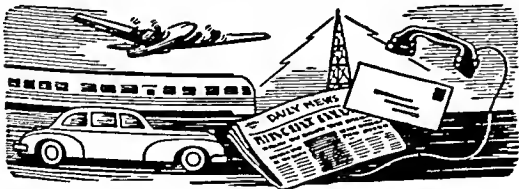
OCCUPATIONS AND PRODUCTS

What the People Do to Earn a Living



Major Industries and Occupations, 1950

Fields of Employment	Number Employed	Percentage of Total Employed
Wholesale and retail trade	169,845	19.5
Agriculture, forestry, and fishery . .	160,595	18.3
Manufacturing	132,476	15.1
Personal services (hotel, domestic, laundering, etc.)	77,839	8.9
Transportation, communication, and other public utilities	75,780	8.7
Professional services (medical, legal, educational, etc.)	72,028	8.2
Construction	64,939	7.4
Government	33,446	3.8
Mining	24,209	2.8
Finance, insurance, and real estate . .	21,969	2.5
Business and repair services	20,158	2.3
Amusement, recreation, and related services	9,071	1.0
Workers not accounted for	13,253	1.5
Total employed	875,608	100.0

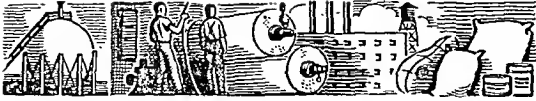


TRANSPORTATION AND COMMUNICATION

Transportation: Railroads, 4,100 miles. First railroad, New Orleans to Lake Pontchartrain, 1831. Rural roads, 39,800 miles. Airports, 86.

Communication: Periodicals, 51. Newspapers, 134. First newspaper, *Le Moniteur de la Louisiane* (*The Louisiana Monitor*), New Orleans, 1794. Radio stations (AM and FM), 55; first station, WWL, New Orleans, licensed March 31, 1922. Television stations, 5; WDSU-TV, New Orleans, began operation Dec. 18, 1948. Telephones, 636,000. Post offices, 730.

Louisiana Fact Summary



What the People Produce

A. Manufactured Goods (Rank among states—23d)

Value added by manufacture* (1952), \$1,090,597,000

Leading Industries in 1947 (with Principal Products)	Value Added by Manufacture	Rank among States
FOOD AND KINDRED PRODUCTS	\$139,137,000	20
Cane sugar; beverages; bakery products; rice cleaning, polishing		
PETROLEUM AND COAL PRODUCTS . . .	121,998,000	6
CHEMICALS AND ALLIED PRODUCTS . .	113,482,000	16
Industrial chemicals		
PAPER AND ALLIED PRODUCTS	99,217,000	11
Pulp and paper mills		
LUMBER AND PRODUCTS	84,089,000	9
TRANSPORTATION EQUIPMENT	34,162,000	19
Shipbuilding and repairing		

*For explanation of value added by manufacture, see Census.



B. Farm Products (Rank among states—29th)

Total cash income (1952), \$446,700,000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among States†
Cotton lint	527,000 bales	1	10
Rice	10,000,000 bags	2	1
Sugar cane	5,008,000 tons	3	1
Milk	310,000,000 qts.	4	37
Cattle	193,052,000 lbs.	5	31
Corn	18,747,000 bu.	6	26
Hogs	159,171,000 lbs.	7	26
Sweet potatoes . .	8,763,000 bu.	8	1

*Rank in dollar value †Rank in units produced



C. Fish (Rank among states—3d)

(Marine waters and coastal rivers, 1950), 316,250,000 lbs.—value, \$23,645,000; (Mississippi River and tributaries, 1950), 16,594,000 lbs.—value, \$1,853,000

D. Minerals (Fuels, Metals, and Stone)

Annual value (1951), \$787,678,000

Rank among states—5th

Minerals (1951)	Amount Produced	Value
Petroleum	232,281,000 bbls.	\$614,680,000
Natural-gas liquids . .	22,482,000 bbls.	64,576,000
Natural gas	1,054,199,000 cu. ft.	61,143,000
Sulfur	1,153,000 tons	25,400,000
Salt (common)	2,737,000 tons	7,662,000

E. Lumber (Rank among states—11th)

1,076,000,000 board feet (5-year average)

F. Trade

Trade (1948)	Sales	Rank among States
Wholesale	\$2,248,613,000	20
Retail	1,681,334,000	25
Service	144,119,000	25

G. Fur (Rank among states—1st)

Value of pelts (1952-53), \$2,826,000

EDUCATION

Public Schools: Elementary, 1,202; secondary, 544. Compulsory school age, 7 through 15. State Board of Education composed of 11 members, one from each of the 3 Public Service Commission districts, elected for 6-year terms, and one from each of the 8 congressional districts, elected for 8-year terms. State supt. of education elected for 4-year term. Each parish has a school board of elected members which appoints or elects a parish supt. for a 4-year term. Independent city boards of education, elected for 4-year terms, appoint city supts. for 4-year terms.

Private and Parochial Schools: 293.

Colleges and Universities (accredited): Colleges, white, 17; Negro, 5. Junior colleges (white), 1. State-supported schools include Louisiana State University, Baton Rouge; Louisiana Polytechnic Institute, Ruston; South-eastern Louisiana College, Hammond; Southwestern Louisiana Institute, Lafayette; Northwestern State College of Louisiana, Natchitoches; McNeese State College, Lake Charles; Northeast Louisiana State College, Monroe; 2 Negro colleges—Grambling College, Grambling; Southern University and Agricultural and Mechanical College, Scotlandville.

Special State Institutions: School for Spastic Children, Alexandria; School for the Blind, Baton Rouge; School for the Deaf, Baton Rouge; School for the Negro Blind, Scotlandville; School for the Negro Deaf, Scotlandville; State Colony and Training School, Pineville.

Libraries: City and town public libraries, 7; independent parish library systems, 39; 1 parish contracts for service with a city library. State library responsible for aid in developing public library service. State Dept. of Education responsible for aid in developing school library service; work headed by supervisor of school libraries.

Outstanding Museums: Louisiana Art Commission, Baton Rouge; Isaac Delgado Museum of Art, Louisiana State Museum, both at New Orleans; Louisiana State Exhibit Building, Shreveport.

CORRECTIONAL AND PENAL INSTITUTIONS

Louisiana Training Institute (for boys), Monroe; Ind. School for Girls, Pineville; Ind. School for Colored Youth, Scotlandville; State Penitentiary, Angola.

PLACES OF INTEREST*

Avery Island—near New Iberia; location of beautiful Jungle Gardens; rare plants; large egret colony (27). Baton Rouge—34-story Capitol offers view of Mississippi River; Magnolia Mound, home of Prince Achille Murat, Napoleon's nephew (see Baton Rouge) (15). Belle Grove—near White Castle; ruins of mansion (22). De Soto's Grave—supposed burial place of explorer; where old mouth of Red R. joined the Mississippi (10). Iberia Livestock Experimental Farm—near New Iberia; Zebu cattle from India bred with native stock (24). Indian Mounds—near Jonesville; 80 feet high; probably used as temples for sun worship (5). Madonna Chapel—tiny chapel near Plaquemine (20). Natchitoches—oldest town in Louisiana Purchase (1713-14); in region of old plantations (3). New Orleans—Vieux Carré (French quarter) includes Cabildo; Absinthe House, haunt of pirates; St. Louis Cathedral; Pontalba Buildings (see New Orleans) (25).

*Numbers in parentheses are keyed to map.



Louisiana Fact Summary

Oak Valley—near Edgard; beautiful ante bellum home; avenue of 28 live oaks (23).

Parlange Plantation—near New Roads; built in middle 1700's; one of state's oldest homes (13).

St. Martin's Church—St. Martinville; grave of Emmeline la Biche, heroine of Longfellow's 'Evangeline' (21).

Shreveport—oil wells, some on lakes; many redbud trees; drive around Cross Lake, city's reservoir; dioramas and displays in Louisiana State Exhibit Building on Louisiana State Fair Grounds (*see* Shreveport); northwest of (2).

Zemurray Estate—near Hammond; artificial lake; gardens of roses, azaleas, camellias, and dogwood (14).

STATE FOREST*

Alexander (Rapides Parish)—8,000 acres (8).

STATE PARKS AND MONUMENTS*

Abita Springs—at Abita Springs; recreational area with picnicking and mineral springs; north of (16).

Audubon Memorial—near St. Francisville; here Audubon made many of his bird pictures; museum and nature area (12).

Bogue Falaya Wayside—in Covington; picnicking; water sports on Bogue Falaya River; east of (14).

Chemin-à-Haut—near Bastrop; many wooded trails; outdoor amphitheater; camping and fishing (1).

Chicot—near Villa Platte; 6,000 acres of woodlands; lake for fishing, boating, swimming; cypress forest (11).

Fontainebleau—near Mandeville; water sports on Lake Pontchartrain; hiking and picnicking (16).

Fort Pike and Fort Macomb State Monuments—historic brick forts constructed after War of 1812 (1819–28) to defend channels to New Orleans; in Civil War captured by Federals (1862); northeast of (26).

Lake Bistineau—near Shreveport; fishing, picnicking (2).

Longfellow-Evangeline—near St. Martinville; restored Acadian house, museum of Acadian life; year-round facilities for picnicking, swimming, and recreation (19).

Marksville Prehistoric Indian—near Marksville; prehistoric Indian village; mounds; water sports on Old River; picnicking; nature museum; northwest of (10).

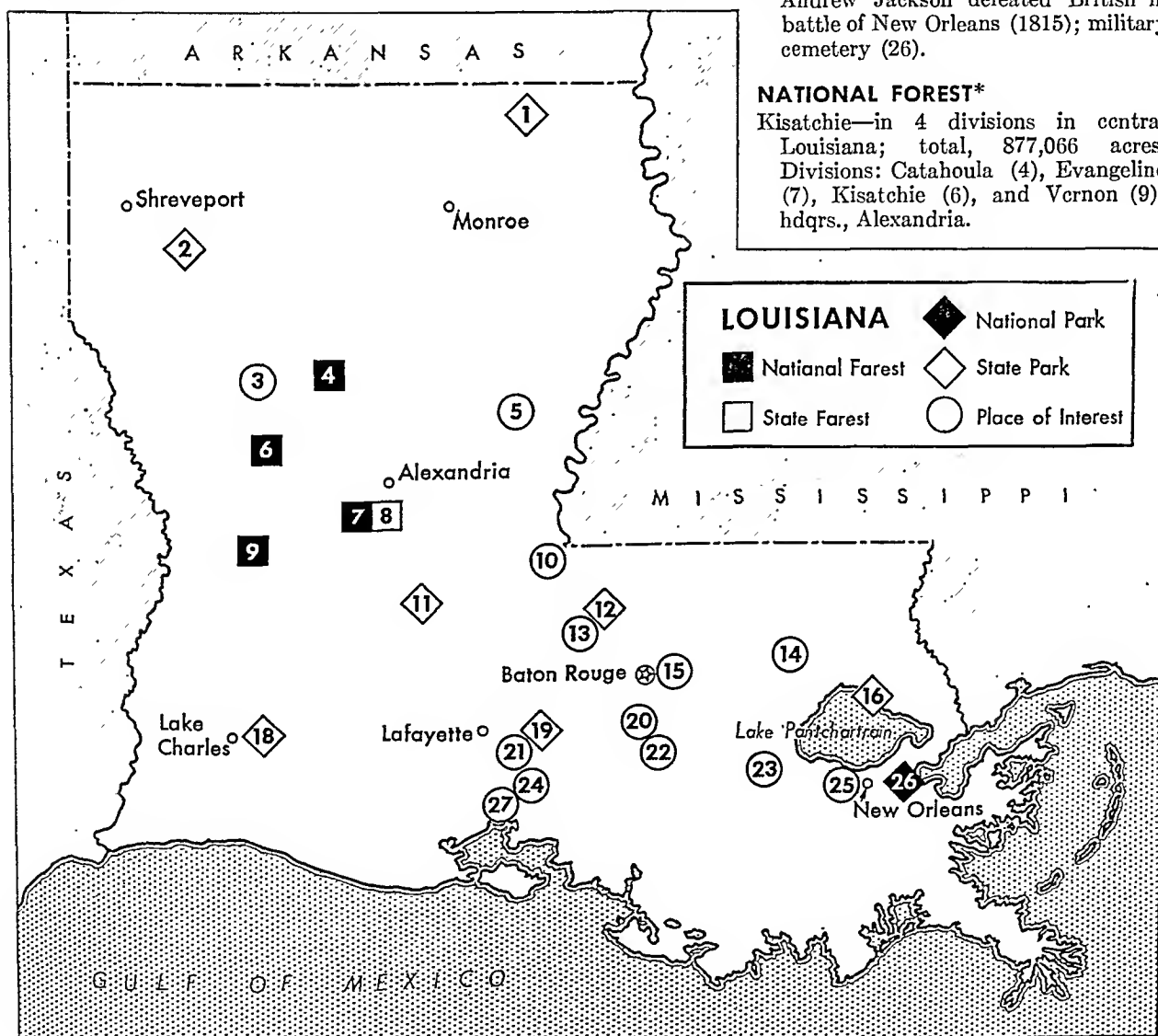
Sam Houston—near Lake Charles; river park site (18).

NATIONAL PARK*

Chalmette National Historical Park—70 acres; here Andrew Jackson defeated British in battle of New Orleans (1815); military cemetery (26).

NATIONAL FOREST*

Kisatchie—in 4 divisions in central Louisiana; total, 877,066 acres. Divisions: Catahoula (4), Evangeline (7), Kisatchie (6), and Vernon (9); hdqrs., Alexandria.



*Numbers in parentheses are keyed to map.

Louisiana Fact Summary

LARGEST CITIES (1950 census)

New Orleans (570,445): one of the world's great ports; large foreign trade; cotton, sugar, grain market; major oil center; sugar-cane products; tourist attractions include old French quarter, Mardi Gras, the Cabildo.

Shreveport (127,206): on Red River; commercial center for surrounding gas and oil fields; metal products.

Baton Rouge (125,629): state capital; Mississippi River port; manufactures chemical, lumber, oil products.

Lake Charles (41,272): port on channel 35 miles from Gulf of Mexico; has oil refineries and rice mills.

Monroe (38,572): gas distributing; paper, barrel staves.

Alexandria (34,913): in timber area; lumber products.

Lafayette (33,541): sugar refineries; cotton gins; canneries.

THE PEOPLE BUILD THEIR STATE

1519—Alonso de Pineda explores Gulf of Mexico, probably discovers Mississippi River.

1541—Hernando de Soto explores northern Louisiana; after his death, Luis de Moscoso leads party back to Mississippi River; descends it to Gulf.

1682—René Robert Cavelier, Sieur de La Salle descends Mississippi River to its mouth, where he claims area drained by it for France; names whole region Louisiana.

1699—Pierre le Moyne, Sieur d'Iberville, explores Louisiana area; visits site of New Orleans.

1712—Louis XIV assigns trading rights in Louisiana to Antoine Crozat.

1713-14—Louis Juchereau de St. Denis builds Fort St. Jean Baptiste on site of Natchitoches.

1717—Spaniards establish mission near Natchitoches; build fort there, 1721. Crozat gives his trading rights in Louisiana to Company of the West, controlled by John Law; company reorganized as Company of the Indies, 1719; Law attracts many settlers by false stories of riches in area; "Mississippi bubble" bursts, 1720, and company collapses.

1718—Iberville's brother, Jean Baptiste le Moyne, Sieur de Bienville founds New Orleans, naming it for Duc d'Orléans, regent of France. First cotton in region planted near Natchitoches.

1722—New Orleans becomes capital of Louisiana.

1725—First school opened in New Orleans.

1729—New Orleans fortified following massacre of French by Indians at Fort Rosalie (Natchez), Miss.

1731—Louisiana becomes French crown colony.

1760—Acadians, expelled from Nova Scotia by British, begin arriving in Louisiana.

1762—Louis XV gives all of Louisiana west of Mississippi River plus "Island of New Orleans" to Spain; rest of Louisiana ceded to Britain, 1763.

1764—First printing press set up at New Orleans.

1768—New Orleans is first American colony to revolt against foreign rule; remains independent until arrival of strong Spanish force, Aug. 17, 1769.

1779—Spain and Britain at war; Bernardo de Galvez seizes Baton Rouge from British, September 21.

1795—Boundary between Louisiana and West Florida (now Mississippi) set at 31° N. Spanish-U. S. treaty permits U. S. navigation on Mississippi and trading rights in New Orleans. Étienne de Boré perfects method for refining cane sugar.

1801—Spain returns Louisiana to France.

1803—Louisiana purchased by the U. S.



1804—Louisiana south of 33d parallel created as Territory of Orleans; first governor, William Claiborne; capital, New Orleans.

1805—First Protestant church in Louisiana established at New Orleans.

1810—Americans in Spanish-held "Florida parishes" rebel; seize Baton Rouge; U. S. forces occupy area.

1811—College of Orleans, first in state, opens.

1812—Louisiana admitted to Union, April 30, as 18th state; capital, New Orleans; governor, William Claiborne. First steamboat, *New Orleans*, navigates Mississippi R. Pittsburgh to New Orleans.

1815—Andrew Jackson, with help of Baratarian pirates, defeats British in battle of New Orleans, January 8.

1819—Spain cedes claim to areas west of Sabine River; state's present boundaries established.

1821—John J. Audubon sets up studio in New Orleans.

1823—First gas well in state drilled near Natchitoches.

1830—Capital moved to Donaldsonville; returned to New Orleans, 1831.

1831—Pontchartrain Railroad, horse-drawn and 4½ miles long, is first railway west of Alleghenies.

1835—Medical College of New Orleans (now Tulane University) opened. Caddo Indians cede their lands in northwest Louisiana; leave state by 1859; Shreveport founded by Captain Henry Shreve.

1838—First Mardi Gras parade held in New Orleans.

1849—Baton Rouge becomes state capital.

1853—Yellow fever epidemic kills more than 11,000 persons in New Orleans.

1860—State Seminary of Learning opened at Alexandria; moved to Baton Rouge as La. State Univ., 1869.

1861—Louisiana secedes from Union; joins Confederacy.

1862—Federal forces under David Farragut take New Orleans, April 25; occupy other points up river.

1864—Confederate forces defeat Union attempt to capture western Louisiana.

1868—Louisiana readmitted to Union, June 25.

1873—New Orleans linked by rail with Chicago.

1879—Jetty system built by James B. Eads on Mississippi allows ocean vessels to ascend to New Orleans.

1883—New Orleans linked by rail with West Coast.

1894—Federal Leprosarium opened at Carville.

1901—Oil discovered near Jennings.

1905—Mining of sulfur begins in Calcasieu Parish.

1916—Monroe gas field discovered.

1921—Present constitution adopted, June 18.

1927—Mississippi flood causes immense damage.

1928—Huey P. Long (born at Winnfield) elected governor; becomes semidictator but builds many valuable public works; elected U. S. senator, 1930.

1935—Huey Long assassinated in State Capitol. Huey P. Long Bridge across Mississippi River dedicated.

1937—Bonnet Carré Spillway is used for first time as high water threatens New Orleans; prevents flood.

1946—Second free port in U. S. opened by New Orleans.

1950—U. S. Supreme Court invalidates Louisiana's claim to rich tidal oil lands.

1951—Democratic primaries open to Negroes; a Negro runs for governor. U. S. Supreme Court holds Univ. of Louisiana law school must admit Negroes. Sulfur deposit found near mouth of the Mississippi.

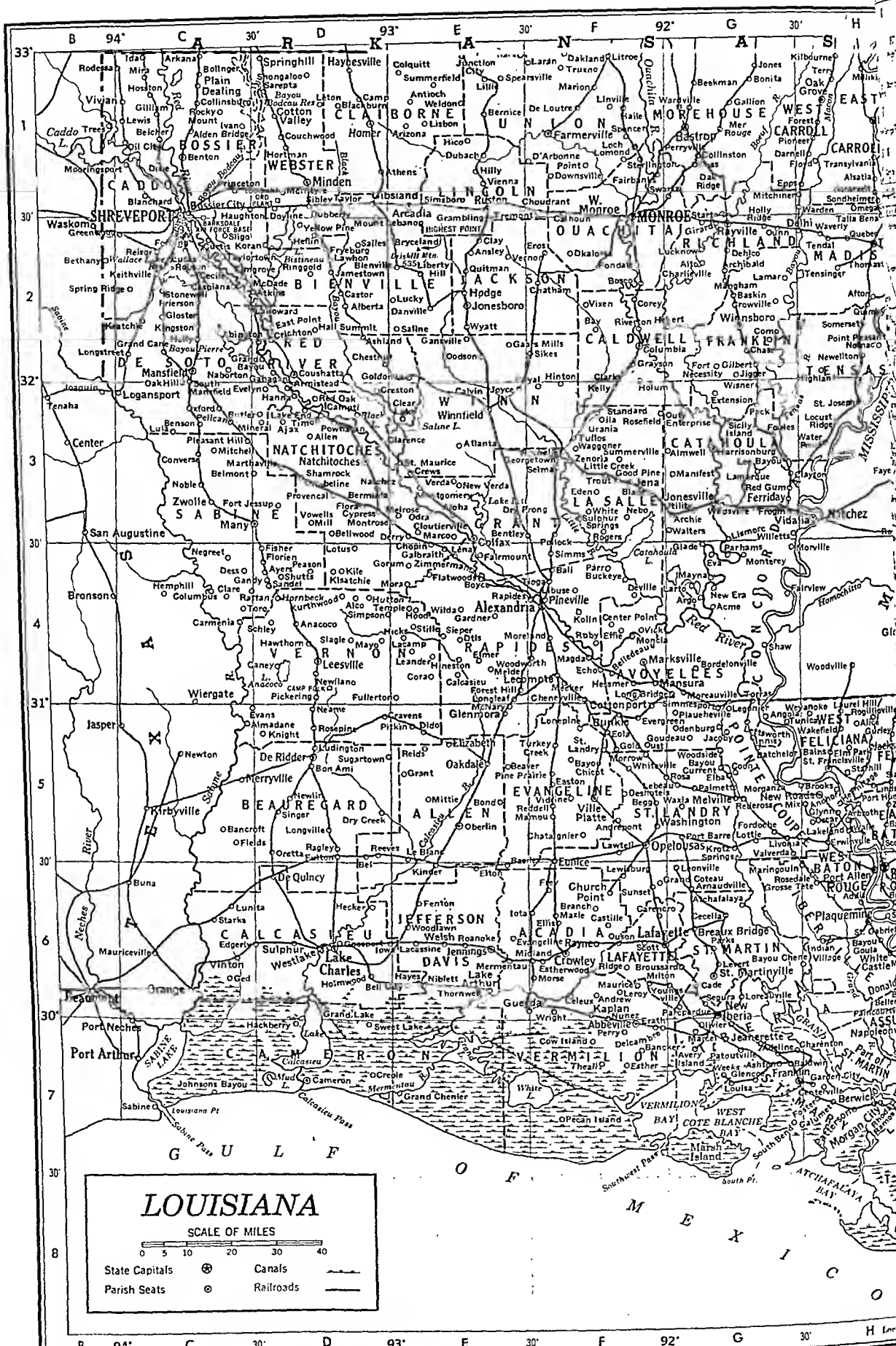
1952—Louisiana's Industry Inducement Plan established.

1953—Congress gives Louisiana and other coastal states rights to minerals, including oil, in submerged tideland within their historic boundaries. President Eisenhower attends celebration of sesquicentennial of Louisiana Purchase in New Orleans.

LOUISIANA

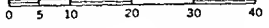
PARISHES

Acadia	47,050	F 6	Alto		G 2	Brusly	493	J 2	Dehlco	75	G 2	Gabagan	5	D 2
Allen	18,835	E 5	Alton		L 6	Bryceland	123	E 2	Delcambre	1,463	F 7	Galbraith		E 4
Ascension	22,387	J 6	Ama	650	N 4	Buckeye		F 4	Delhi	1,861	H 2	Galliano	2,100	K 8
Assumption	17,278	H 7	Amelia		H 7	Bunkie	4,666	F 5	Delta	150	J 2	Gallion		G 1
Avoyelles	38,031	G 4	Amite	2,804	K 5	Buras	1,200	L 8	Delta Farms	25	K 7	Galvez	500	L 2
Beauregard	17,766	D 5	Anacoco	500	D 4	Burnside	600	L 3	Denham Springs	2,053	L 2	Gandy		D 4
Bienville	19,105	D 2	Anchor		H 5	Burrwood	150	M 8			L 2	Gansville	25	E 2
Bossier	40,139	C 1	Andrepoint		F 5	Burville	38	K 2	Dennis Mills		L 1	Garden City		H 7
Caddo	176,547	C 1	Andrew	110	F 6	Bush	150	L 5	Derry		E 3	Gardner	200	E 4
Calcasieu	89,635	D 6	Angie	230	L 5	Butler		C 3	Desbottels	50	F 5	Garyville	1,850	M 3
Caldwell	10,293	F 2	Angola		G 5	Cabinash	40	K 8	Dess	7	C 4	Ged		C 6
Cameron	6,244	D 7	Ansley	600	E 2	Cade	750	G 6	Destrehan	850	N 4	Geismar		K 3
Catahoula	11,834	G 3	Antioch	50	E 1	Calcasieu	80	E 4	Deville		F 4	Georgetown	355	F 3
Claborn	25,063	D 1	Arabi	5,585	L 7	Calhoun	600	F 2	Diamond		L 7	Gbeens		K 7
Concordia	14,398	G 4	Arbroth		H 5	Calumet	100	H 7	Dido		E 5	Gibbsland	1,085	E 1
De Soto	24,398	C 2	Archadia	2,241	E 1	Calvin	300	E 3	Dixie		C 1	Gibson	500	J 7
East Baton Rouge			Archibald	168	G 2	Camp	950	D 1	Dodson	375	E 2	Gilbert	452	G 2
East Carroll	16,302	H 1	Archie	250	G 3	Camp	8	D 7	Donaldsonville			Gilliam	1,579	C 1
East Feliciana			Arcola	100	K 5	Campiti	1,014	D 3			K 3	Girard		G 2
	158,236	K 1	Argo		G 4	Caney		D 4	Donner	4,150	J 7	Glade		G 4
	19,133	H 5	Arizona	300	E 1	Carencro	1,587	F 6	Dorcyville	400	J 3	Glenoc		G 7
Evangeline	31,629	F 5	Arkana		C 1	Carlisle	15	L 7	Doss	50	G 1	Glenmora	1,556	E 5
Franklin	29,376	G 2	Armistead	50	D 3	Carmenia	50	C 4	Downsville	188	F 1	Gloria		K 7
Grant	14,263	E 3	Arnaudville	872	G 6	Carville	2,200	K 3	Doyle	350	L 1	Gloster	1,000	C 2
Iberia	40,059	G 7	Ashland	200	D 2	Casplana	350	C 2	Doyline	1,170	D 1	Glynn		H 5
Iberville	26,750	H 6	Ashton		G 7	Castille		F 6	Dry Creek		D 5	Gold Dust	175	F 5
Jefferson	15,434	E 2	Atchafalaya	300	G 6	Castor	171	D 2	Dry Prong	377	E 3	Golden Meadow		K 8
Jefferson Davis	103,873	K 7	Athens	487	E 1	Cecilia	500	G 6	Dubach	703	E 1	Goldonna	364	D 2
			Atkins	150	D 2	Cecil	225	C 2	Dubberly	173	D 1	Gonzales	1,642	L 2
			Atlanta		E 3	Center Point		F 4	Dulac		J 8	Good Hope	966	N 4
			Avery Island		G 7	Centerville		H 7	Dunn	280	G 2	Good Pine	500	F 3
					K 4	Central		L 3	Duplessis		K 2	Goodbee	225	K 6
La Salle	12,717	F 3	Avoca		D 4	Cbacadoula		L 7	Duson	707	F 6	Goosport	8,318	D 6
Lafayette	57,743	F 6	Ayers		H 5	Chalmette	1,695	L 7	Dutch Town	7	K 2	Gorum	250	E 4
Lafourche	42,209	K 7	Bains		D 4	Chamberlin	400	J 1	Duty		G 3	Goudau	500	G 5
Lincoln	25,782	E 1	Baker	762	K 1	Charenton		H 7	East Point	200	D 2	Grambling	1,100	E 1
Livingston	20,054	L 2	Baldwin	1,138	H 7	Charicville		G 2	Easton	250	F 5	Gramercy	1,184	M 3
Madison	17,451	H 2	Ball		F 4	Chase	80	G 2	Echo	500	F 4	Grand Bayou	500	C 2
Morehouse	32,038	G 1	Bancker	75	F 7	Chataignier	500	F 5	Eden	200	F 3	Grand Cane	286	C 2
Natchitoches			Bancroft		C 5	Chatham	833	F 2	Edgard		M 3	Grand Chenier		
	38,144	D 3	Baptist	600	M 1	Chauvin	3,500	J 8	Edgerly	500	C 6			
Orleans	570,445	L 6	Barataria		K 7	Cbeft Menteur	150	F 4	Elba		G 5	Grand Coteau	258	E 7
Ouachita	74,713	F 2	Barton		K 3	Cheneyville	918	F 4	Elizabeth	1,113	E 5	Grand Isle	1,103	G 6
Plaquemines			Basile	1,572	E 5	Chestnut	75	D 2	Ellendale		J 7	Grand Lake	150	D 6
	14,239	L 8	Baskin	117	G 2	Chipola	18	J 5	Ellis		F 6	Grangeville	150	J 5
Pointe Coupee			Bass		K 1	Chopin		E 4	Elm Park	300	H 5	Grant		E 5
	21,841	G 5	Bastrop	12,769	G 1	Church Point	395	F 1	Elmer	30	E 4	Gray	375	J 7
Rapides	90,648	E 4	Batchelor	1,936	G 5				Elmgrove	1,434	E 6	Grayson	455	F 2
Red River	12,113	D 2	BATON ROUGE	125,629	K 2	Cinclare	2,897	F 6	Elton	475	L 8	Greensburg	423	J 5
Richland	26,672	G 2	Bay		F 2	City Price		J 2	Empire	35	G 3	Greenwell		
Sabine	20,880	C 3	Bayou Barbary		M 2	Clare		C 4	Enterprise		F 5	Springs	500	K 1
Saint Bernard				150	G 6	Clarence	250	E 3	Eola	308	G 1	Greenwood	300	B 2
	11,087	L 7	Bayou Chene		F 5	Clarks	1,345	F 2	Epps	1,514	F 7	Gretna	13,813	O 4
Saint Charles			Bayou Chicot	250	G 5	Clay		E 2	Erath	195	F 2	Grosse Tete	548	G 6
	13,363	K 7	Bayou Current		J 3	Clayton	657	H 3	Eros	350	H 5	Gueydan	2,041	E 6
Saint Helena	9,013	J 5	Bayou Goula		K 1	Clear Lake	100	E 3	Erwinville		F 7	Gullett	200	J 5
Saint James			Baywood		E 5	Clifton		K 5	Esther		G 5	Gurley	211	H 5
	15,334	L 3	Beaver		G 1	Clinton	1,383	J 5	Estherwood	547	F 6	Hackberry	1,500	D 7
Saint John the Baptist	14,861	M 3	Beekman	250	D 6	Clio		M 2	Ethel		H 5	Hackley	100	K 5
Saint Landry			Begg	20	F 6	Clouterville		E 3	Eunice	8,184	F 6	Hahnville	1,475	N 4
	78,476	F 5	Bel		C 1	Colfax	1,651	E 3	Eva	606	F 6	Haile	175	F 1
Saint Martin			Belcher	300	D 1	Collinsburg	25	C 1	Evangeline		D 5	Hall Summit		D 2
	26,353	G 6	Bell City	221	D 6	Collinston	546	G 1	Evans	25	D 3	Hammond	8,010	N 1
Saint Mary	35,848	H 7	Belle Alliance	200	K 3	Colquitt	30	E 1	Evelyn	382	F 5	Hanna		D 3
Saint Tammany			Belle Chasse		O 4	Columbia	920	F 2	Evergreen		G 3	Happy Jack		L 7
	26,988	L 6	Belle Helene	30	K 3	Columbus	160	C 4	Extension	1,000	F 1	Harahan	3,394	O 4
Tangipahoa	53,218	K 5	Belledeau	75	F 4	Comite		K 1	Fairbanks	30	H 4	Harrisonburg	544	G 3
Tensas	13,209	H 2	Bellerose		K 3	Como		G 2	Fairmount	3,173	F 1	Harvey	8,000	O 4
Terrebonne	43,328	J 8	Bellwood		D 3	Convent	1,200	L 3	Fairview		L 3	Haughton	501	C 1
Union	19,141	F 1	Belmont	300	C 3	Converse	311	G 5	Fenton	450	E 6	Hawthorn		D 4
Vermilion	36,929	F 7	Benson	200	E 3	Coon		E 4	Ferriday	3,847	G 3	Hayes	800	E 6
Vernon	18,974	D 4	Bentley		C 1	Cora		L 1	Fields	10	C 5	Haynesville	3,040	D 1
Washington	38,371	K 5	Benton	741	D 3	Corbin		F 2	Fisher	400	D 4	Head of Island		
Webster	35,704	D 1	Bermuda		E 1	Corey	200	K 2	Flatwoods	500	E 4	Hebert	332	L 2
W. Baton Rouge			Bernice	1,524	E 1	Cornerview		D 1	Flora	250	D 3	Hecker	150	G 2
	11,738	H 6	Bertrandville	200	L 7	Cotton Valley		F 5	Florien	497	H 1	Heflin	75	D 6
W. Carroll	17,248	H 1	Berwick	2,619	H 7		1,188	D 1	Floyd		K 5	Hermitage	460	D 2
W. Feliciana	10,169	H 5	Bethany	350	D 2	Cottonport	1,534	F 5	Fluker		K 5	Hessmer	500	F 4
Winn	16,119	E 3	Bienville	445	D 1	Coushatta	600	D 2	Folsom	166	K 5	Hicks	216	E 4
			Blackburn	15	D 1	Covington	1,788	K 5	Fondale	94	C 2	Hico		E 1
			Blade	75	F 3	Cow Island	25	F 7	Forbush	50	G 5	Highland		H 2
			Blanchard	400	C 1	Cravens		D 7	Forece	200	H 1	Hilly		E 1
CITIES AND TOWNS			Blond	20	K 5	Creole	150	D 7	Forest Hill	365	E 4	Hineston		E 4
Abbeville	9,338	F 7	Bogalusa	17,798	L 5	Creole	400	J 2	Fort Jessup	45	C 3	Hinton	20	F 2
Abington	100	C 2	Bolinger	50	C 1	Creston	275	E 3	Fort Necessity		G 2	Hobart	160	L 2
Abita Springs	559	L 6	Bolivar		K 5	Creston	25	E 3	Fort Saint Philip	15	M 8	Hodge	1,386	E 2
Acme		G 4	Bon Ami		D 5	Crews	10	D 2			H 7	Hohen Solms		K 3
Acy	238	L 3	Bond	60	E 5	Crichton		G 1			G 3	Holden		M 1
Addis	505	J 2	Bonfouca		L 6	Crowley	12,784	F 6			G 7	Holly		C 2
Adeline		G 7	Bonita	504	G 1	Crowville	225	G 2			K 5	Holly Ridge		G 2
Afton		H 2	Boothville	600	M 8	Curtis	77	C 2			L 2	Holmwood	100	D 6
Almwell		G 3	Bordelonville		G 4	Cut Off		K 7			N 3	Holton	90	K 5
Ajax	150	D 3	Bosco	150	F 2	Cypress	325	D 3			F 6	Holum	60	F 3
Akers	500	N 2	Bossier City	15,470	C 1	Dalcor		P 4			C 2	Homeplace	300	L 8
Albany	1,000	M 1	Boudreaux	200	J 8	Danville		E 2			G 3	Homer	4,749	D 1
Albamarle	150	K 4	Bourg	860	N 4	D'Arbonne	30	F 1			L 2	Hood	150	E 4
Alco	35	D 2	Boutte	981	E 4	Darlington	40	G 1			L 2	Horne Villa		K 2
Alden Bridge	100	C 1	Boyce	200	P 4	Darnell	300	K 3			D 2	Hornbeck	524	D 4
Alexandria	34,913	E 4	Braithwaite	250	F 6	Darrow		L 7			D 4	Hortman	40	D 1
Alice	20	H 5	Branch		G 6	Davant		L 7			D 5	Hosston	750	C 1
Allemands		N 4	Breaux Bridge	2,492	G 6	De Lacroix	10	L 7						
Allen		D 3	Brignac	250	L 2	De Loutre	3,837	D 6						
Almadene						De Quincy								

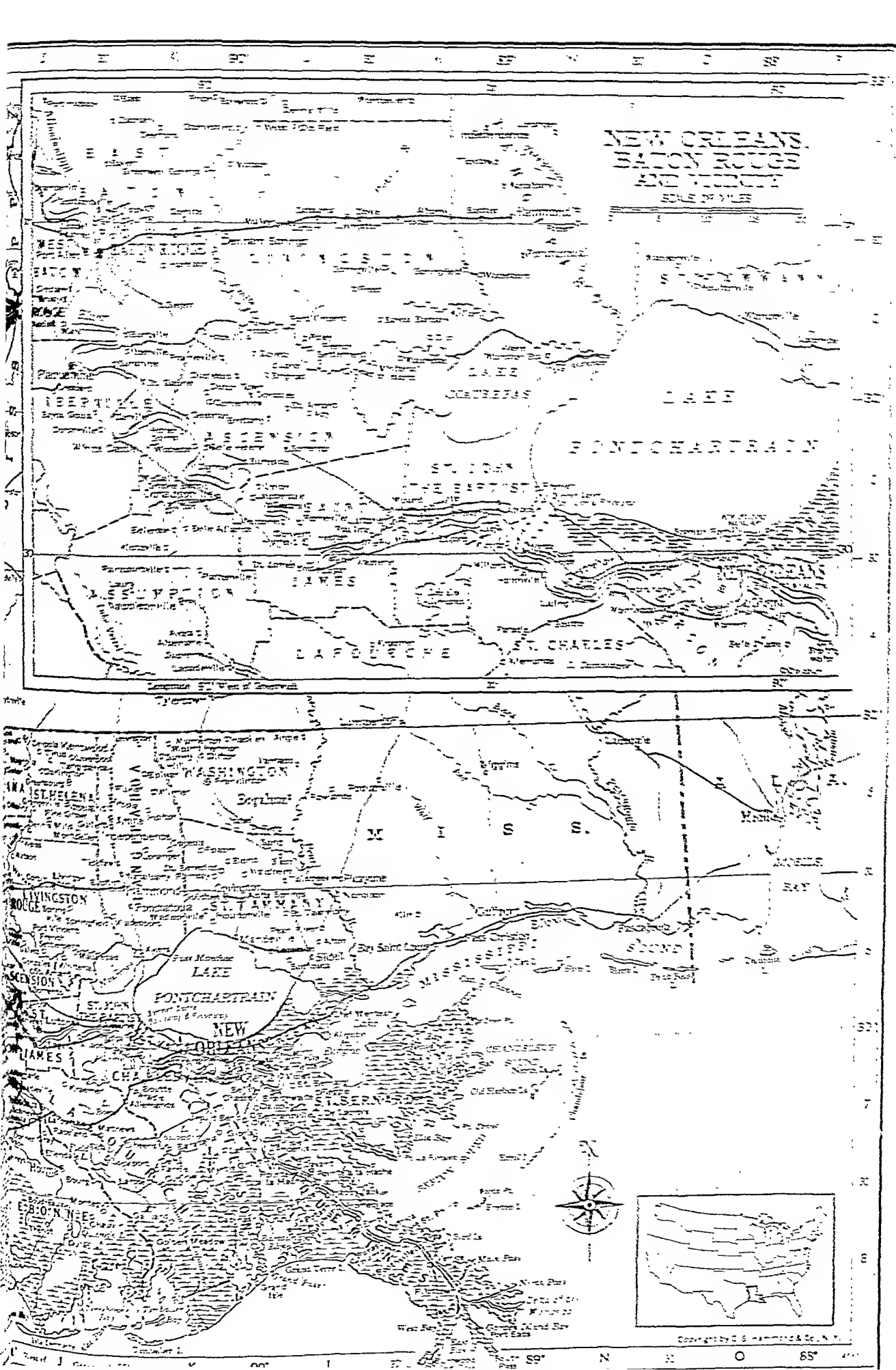


LOUISIANA

SCALE OF MILES



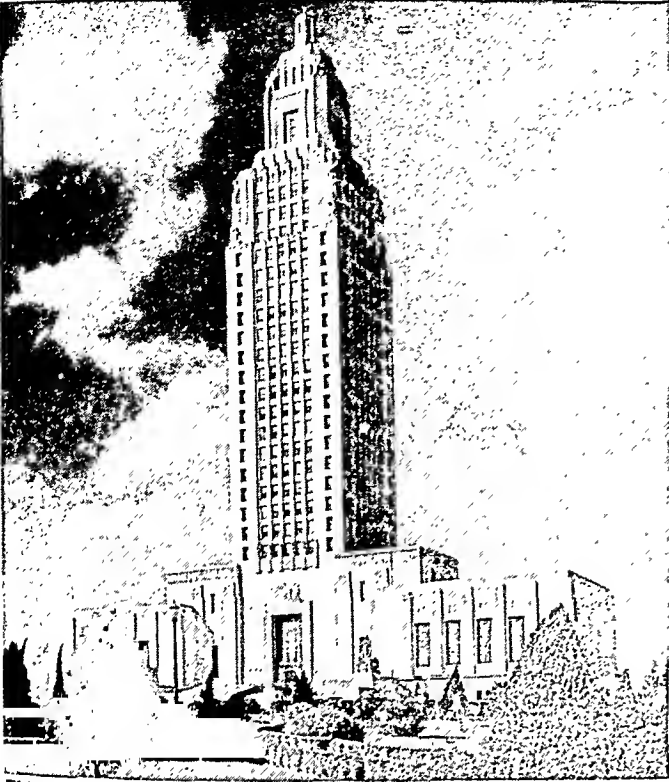
- | | |
|----------------|---|
| State Capitals | ⊕ |
| Parish Seats | ⊙ |
| Canals | — |
| Railroads | — |



LOUISIANA—Continued

Houma	11,505	J 7	Liverpool	175	J 5	Nebo	350	F 3	Reggio	L 7	Sunshine	800	K 2
Humphreys	200	J 7	Livingston	600	L 1	Negreet		C 4	Reids	E 5	Supreme	1,000	K 4
Hutton	125	D 4	Livonia	500	G 5	Nero		L 7	Relley	J 5	Swartz	1,000	G 1
Hymel	391	L 3	Lohdell		J 1	New Era	145	G 4	Reisor	C 2	Sweet Lake	40	D 7
Iberville	480	K 2	Loch Lomond		F 1	New Iberia	16,467	G 6	Remy	1,064	Taft		N 4
Ida	525	C 1	Lockhart	25	E 1	New Orleans			Reserve	4,465	Talisheek	250	L 5
Independence	1,606	M 1	Lockport	1,388	K 7			O 4	Rhoda	200	Talla Bena	25	H 2
Indian Village	900	H 6	Locust Ridge	40	H 3	New Roads	2,818	G 5	Ridge	100	Tallulah	7,758	H 2
Innis		G 5	Logansport	1,270	C 3	New Verda		E 3	Ringgold	1,007	Tangipahoa	352	J 5
Iota	1,162	E 6	Lonepine	500	F 5	Newellton	1,280	H 2	Rio	300	Taylor	400	D 1
Iowa	1,125	D 6	Long Bridge		F 4	Newlin	25	D 5	Rita	500	Taylorstown		C 2
Isabel	10	K 5	Longleaf	1,200	E 4	Newlano	277	D 4	Riverton		Temple	100	E 4
Istrouma		K 1	Longstreet	224	B 2	Nihlett		E 6	Roanoke	500	Tendal		H 2
Ivan	300	C 1	Longville	250	D 5	Noble	238	C 3	Robeline	350	Tensinger		H 2
Jackson	6,772	H 5	Loranger	1,000	N 1	Norco	2,400	N 3	Robert		Terry	255	H 1
Jacoby		G 5	Loreauville	478	G 6	North Baton Rouge		K 1	Robson		Theall		F 7
Jamestown	300	D 2	Lottie	500	G 5	Norwood	414	H 5	Rochelle		Theriot	150	J 8
Jeanerette	4,692	G 7	Lotus		D 4	Notnac	50	H 2	Rocky Mount	130	Thibodaux	7,730	J 7
Jena	1,438	F 3	Louisia	150	G 7	Nunez		F 6	Rodessa		Thomastown		H 2
Jennings	9,663	E 6	Lucas	100	C 2	Oak Grove	1,796	H 1	Rogers		Thornwell		E 6
Jesuit Bend		K 7	Lucknow		G 2	Oak Ridge	287	G 1	Rogillioville	15	Tickfaw	100	M 1
Jigger	500	G 2	Lucky	75	E 2	Oakdale	5,598	E 5	Romeville	200	Timon	180	D 3
Johnsons Bayou	20	C 7	Lucy	520	M 3	Oakland		F 1	Roosevelt	25	Tinus	135	J 5
Jones	250	G 1	Ludington		D 5	Oherlin	1,544	E 5	Rosa	100	Tioga	338	F 4
Jonesboro	3,097	E 2	Lula		C 3	Odenburg	130	G 5	Rosedale	600	Toro		C 4
Jonesville	1,954	G 3	Luling	1,100	N 4	Odra	25	C 3	Rosefield		Torras		G 4
Joyce		E 3	Lunita		C 6	Old City	422	C 1	Roseland	1,038	Transylvania		H 1
Junction City	514	E 1	Lutcher	2,198	L 3	Okaloosa	100	F 2	Rosepine	334	Trees	75	B 1
Kahns	200	J 1	Madisonville	861	K 6	Old Field		L 1	Royal	10	Tremont		E 1
Kaplan	4,562	F 6	Magda		F 4	Olga	33	M 8	Ruby		Triumph	600	L 8
Keatchie	186	C 2	Magnolia	300	J 5	Oliver	350	G 7	Ruston	10,372	Trout	550	F 3
Keithville	500	C 2	Mamou	2,254	F 5	Olla	1,115	F 3	Sailes	20	Truxno	92	F 1
Kelly		F 3	Manchac Station		N 2	Omega	25	H 1	Saint Amant	500	Tullus	732	F 3
Kenner	5,535	O 4	(Akers)	500	N 2	Opeousas	11,659	G 5	Saint Benedict	25	Tunica	100	G 5
Kentwood	2,417	J 5	Mandeville	1,368	L 6	Orella	50	D 5	Saint Bernard		Turkey Creek	400	F 5
Kilbourne	500	H 1	Mangham	554	G 2	Oscar	418	H 5	Saint Francisville		Union		L 3
Kille		D 4	Manifest		G 3	Osceola	200	K 5		936	Urania	1,004	F 3
Killian		M 2	Mansfield	4,440	C 2	Ostria		L 8	Saint Gabriel	800	Utility		G 3
Killona		N 4	Mansura	1,439	G 4	Otis		E 4	Saint James	600	Vacherie	4,026	L 3
Kinder	2,003	E 6	Many	1,681	C 3	Oxford	300	C 3	Saint Joseph	1,218	Vaiverda		G 5
Kingston	50	C 2	Marcel		G 7	Paincourtville		K 4	Saint Landry	800	Varnado	306	L 5
Kisatchie		D 4	Marco		E 3	Palmetto	457	G 5	Saint Martinville		Venice	1,500	M 8
Klotzville		K 3	Marion	898	G 6	Paradis	1,500	N 4		4,614	Verda	160	E 3
Knight	500	D 5	Marlingouin	685	F 1	Parcperdue	50	G 6	Saint Maurice		Vernon	65	E 2
Koifin	300	F 4	Mark		J 2	Parhams		G 4	Saint Rose		Vick		F 4
Koran		D 2	Marksville	3,635	G 4	Parks	460	G 6	Saint Tammany		Vidalia	1,641	G 3
Kraemer		M 4	Marrero	7,800	O 4	Parr		F 4	Salline	357	Vidrine	150	F 5
Krotz Springs	866	G 5	Marthaville	121	D 3	Patoutville	300	G 7	Sandel		Vienna	250	E 1
Kurthwood	50	D 4	Mathews		J 7	Paterson	1,938	H 7	Sarepta	750	Ville Platte	6,633	F 5
Lahadieville	600	K 4	Maurepas		M 2	Paulina		L 3	Satsuma		Vinton	2,697	O 6
Lacamp		E 4	Maurice	335	F 6	Pearl River	637	L 6	Schley		Violet	800	L 7
Lacassine		E 6	Maxie	150	F 6	Peason	8	D 4	Schriever	500	Vivian	2,426	B 1
Lacombe		L 6	Mayna		G 4	Pecan Island		F 7	Scotlandville	4,368	Vixen		F 2
Lafayette	33,541	F 6	Mayo	35	D 4	Peck	25	G 3	Scott	688	Vowells Mill	175	D 3
Lafitte		K 7	Mc Call		K 3	Pelican	140	C 3	Segura		Wadesboro		N 2
Lafourche		J 7	Mc Dade		D 2	Perry	175	F 7	Selma		Waggaman	500	O 4
Lagan		L 4	Mc Intyre	200	D 1	Perryville		G 1	Shamrock	100	Wagoner		F 3
Lahoward	120	D 2	Mc Nary	267	E 5	Phoenix	300	L 7	Shaw	60	Wakefield	200	H 5
Lake	300	L 2	Meeker		F 4	Pickering		D 4	Shongaioo		Walheim	43	L 1
Lake Arthur	2,849	E 6	Melder	100	E 4	Pilotown	250	M 8	Shreveport	127,206	Walker	500	M 3
Lake Charles			Melrose	850	E 3	Pine Grove	500	J 5	Shrewshury	6,000	Wallace		H 5
			Melville	1,901	G 5	Pine Prairie	575	F 5	Shutts		Walls		G 3
			Mer Rouge	784	G 1	Pineville	6,423	F 4	Sibley	623	Walters		H 1
			Mermentau	636	E 6	Pioneer		H 1	Sicily Island		Warden		G 1
			Merryville	1,383	D 5	Pitkin	475	E 5	Siegen		Wardville		G 1
			Midland	600	F 6	Plain Dealing			Sieper		Warnerton		K 5
			Millickin	116	H 1			C 1	Sikes	342	Washington	1,291	G 5
			Milton		F 6	Plaquemine	5,747	J 2	Simmesport	1,510	Water Proof	1,180	H 3
			Minden	9,787	D 1	Plattenville		K 4	Simms		Watson	400	L 1
			Mineral		D 3	Plaucheville	277	G 5	Simpson		Waverly		H 2
			Mira		C 1	Pleasant Hill	856	C 3	Simshoro	500	Waxia	567	G 5
			Mitchell	150	C 3	Point	100	F 1	Singer	250	Weeks	1,499	G 7
			Mitchiner	15	G 1	Point Pleasant	50	H 2	Slagle	300	Wells		L 1
			Mittie		E 5	Pointe a la Hache			Slaughter	290	Welton	300	L 3
			Mix		G 3		1,000	L 7	Siddell	3,464	Weldon	35	E 1
			Modeste	350	K 3	Poley		L 2	Silgo	125	Welsh	2,416	E 6
			Moncla	143	F 4	Pollock	421	F 3	Smoke Bend		W. Monroe	10,302	F 1
			Monroe	38,572	F 1	Ponchatoula	4,090	N 2	Somerset	275	Westlake	1,871	D 4
			Montegut		J 8	Port Allen	3,097	J 2	Sondheimer	600	Westwego	8,328	O 6
			Monterey	300	G 4	Port Barre	1,066	G 5	Sorrento		Weyanoke		H 5
			Montgomery	695	E 3	Port Eads	15	M 8	South Bend		White Castle	1,839	J 3
			Montpelier		M 1	Port Hudson	50	J 1	South Mansfield				
			Montrose		D 3	Port Sulphur	978	L 8		276	Springs	50	F 3
			Montz		M 3	Port Vincent		L 2	South Pass		Whiteball	450	M 2
			Mooringsport	709	B 1	Potash	276	L 8	Spanish Fort	200	Whiteville		F 5
			Mora	200	E 4	Powhatan	500	D 3	Spearsville	100	Wilda		E 4
			Moreauville	835	G 4	Prairieville		K 2	Spencer	160	Wildsville		G 3
			Moreland	300	E 4	Pride	30	K 1	Spring Ridge		Willets	12	L 7
			Morgan City	9,759	H 7	Princeton	500	C 1	Springfield	1,000	Wills Point		K 5
			Morganza	817	G 5	Provençal	600	D 3	Springhill	3,383	Wilmer	75	H 5
			Morrow	460	F 5	Quehec	10	H 2	Springville	50	Wilson	3,759	E 3
			Morse	679	F 6	Quimby	250	H 2	Standard	100	Winnfield	5,629	G 2
			Morville	60	H 4	Quitman	204	E 2	Starhill	150	Winnshoro	3,655	G 3
			Mound	105	H 2	Raceland	2,025	J 7	Starks		Wisner	738	J 5
			Mount Airy	400	M 3	Ragley		D 5	Start		Woodland		E 6
			Mount Hermon		K 5	Ramos	60	H 7	Sterlington		Woodlawn	210	G 4
			Mount Lehanon		D 2	Ramsay		K 5	Stille		Woodside		E 5
			Myrtle Grove	250	K 7	Rapides		E 4	Stonewall		Woodworth	392	F 6
			Naborton		C 2	Rattay	6	C 4	Stonypoint		Wright	36	E 2
			Nairn	200	L 8	Rayne	6,485	F 6	Sugartown	500	Wyatt	40	F 6
			Napoleonville		K 4	Rayville	3,138	G 2	Sulphur	5,996	Yellow Pine	90	D 2
			Natahany	1,260	N 1	Red Gum		G 3	Summersfield	200	Youngsville	769	G 6
			Natchez	300	D 3	Red Oak	10	D 3	Summerville	200	Zachary	1,542	K 1
			Natchitoches	9,914	D 3	Redcross	7	G 5	Sun		Zemoria	100	F 3
			Neame		D 5	Reddell		F 5	Sunny Hill	50	Zimmerman	500	E 4
						Reeves	106	D 5	Sunset	1,080	Zwolle	1,555	C 3

LOUISIANA'S SKYSCRAPER CAPITOL



This graceful, clean-lined building stands near the Mississippi in a beautiful park in Baton Rouge.

has lumber mills and fertilizer and glass plants (see Shreveport). Baton Rouge, the state capital—a picturesque and historic old French-Spanish town on the Mississippi River—is a great petroleum-refining center, shipping oil all over the world (see Baton Rouge). Monroe produces gas and carbon black in great quantities, and Alexandria echoes the buzzing of sawmills. Lake Charles, with one of the world's largest rice mills, ships to the Gulf through a deep channel.

With its 7,300 miles of inland navigable waters, making a web of paths to the ocean, Louisiana is one of the richest states in the Union in natural highways. Yet all the rest of these waterways put together are not worth the 600 miles of the Mississippi within the state, and especially the control of its outlet to the ocean. Before the coming of the railroads New Orleans was the mart through which practically all the commerce of the whole Mis-

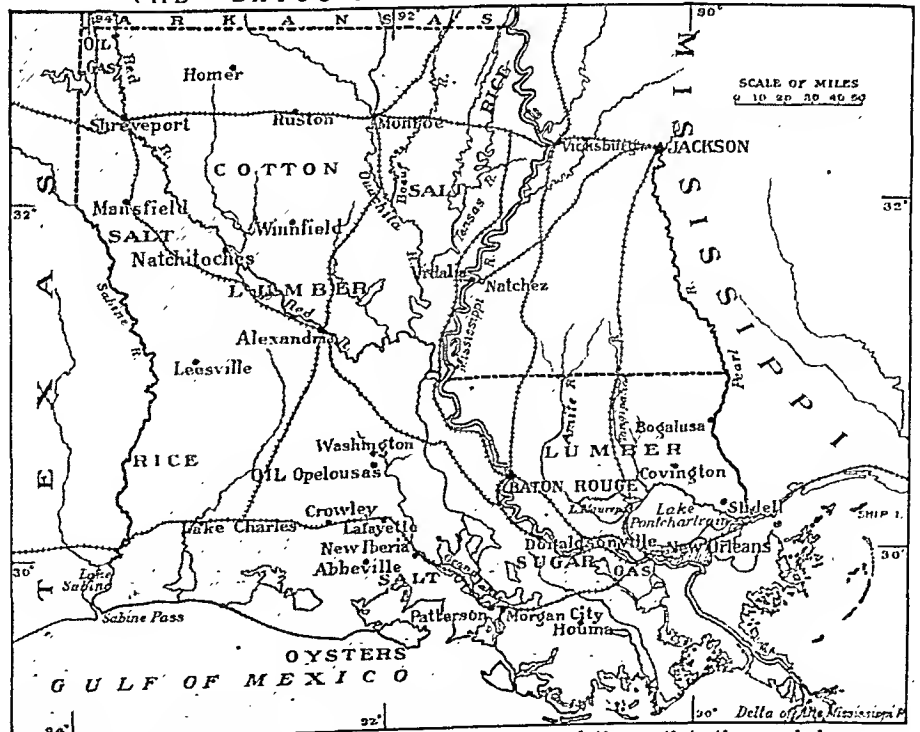
issippi Valley had to pass. The first east-west railroads diverted much of this trade to Atlantic coast cities. But the importance of New Orleans was renewed by a fresh tide of north-south commerce within North America. Railroad lines now fan out from the city, competing with the waterways as links with the interior. New Orleans is also a great doorway for the steadily growing trade between North and South America.

Old Traditions and Laws

The early history of the state is reflected not only in the many French and Spanish names on the map, but also in the strong French and Spanish elements in the population, customs, and architecture—especially in New Orleans, Baton Rouge, and other old towns—and even in the Latin basis of the state laws. Louisiana is the only state in the Union in which the legal system is not based on the English common law. When under the control of Spain, the colony had of course been governed in accordance with Spanish laws. In that portion of the Louisiana Purchase which forms the present state of Louisiana, the United States Federal government promised not to alter the established legal system. The old Spanish laws and the then recently promulgated Napoleonic Code of France were both used by Edward Livingston and his associates in compiling the Louisiana Code between 1805 and 1824. Louisiana

criminal and commercial law is largely based on English precedent, but the civil law today remains chiefly that of the early French and Spanish colonizers.

THE "BAYOU STATE" AND ITS PRODUCTS



Louisiana slopes gradually from the low plateaus and hills of the north to the wooded swamps and grassy marshes of the coast. This map shows the principal products of the state and some of the chief producing districts.

A heritage from early days is the use of the name "parish" for the administrative unit which corresponds to "county" in other states.

Progressive Program of Education and Health

State-supported institutions of higher learning include Louisiana State University and Agricultural and Mechanical College, at Baton Rouge; Louisiana Northwestern State College of Louisiana, at Natchitoches; Louisiana Polytechnic Institute, at Ruston; Southwestern Louisiana Institute, at Lafayette; and Southeastern Louisiana College, at Hammond. Among other well-known universities and colleges are Tulane University and Loyola University, both at New Orleans. The state's trade and vocational schools are known the nation over. There is a state-wide program of health education, and free hospital service and dental care are provided for low-income groups.

The History of Louisiana

When La Salle descended the Mississippi River, in 1682, he took possession in the name of France of the vast unknown region drained by the river, which he named Louisiana in honor of Louis XIV. Returning with a colony in 1684, he failed to find the river's mouth and landed in Texas, where he was murdered. The honor of laying the foundation of the colony fell to the Canadian Pierre le Moyne d'Iberville, who in 1699 made the first settlement within the present state limits and whose brother Bienville founded New Orleans. As a financial speculation Louisiana was a bitter disappointment to Antoine Crozat, who held it under royal grant from 1712 to 1717; to the creditors of John Law's "Mississippi Company," the next promoter; and to the crown, which resumed control in 1731. The most spectacular failure was that of John Law, who had promised to pay the French public debt with the proceeds of the exploitation of the colony. The expectations of profit were so enormous that there was frenzied speculation in Paris, known after Law's downfall in 1720 as the "Mississippi bubble."

In 1762, during the Seven Years' War, France secretly ceded New Orleans and the vast region west of the Mississippi to its ally, Spain. The colonists did not learn of the transfer officially until two years later. Then, angered at being cast off by the mother country and fearing financial disaster in the loss of the French market for their indigo, they drove out Ulloa, the first Spanish governor, in 1768. His successor repressed them with an iron hand, and they settled down to endure what proved to be, for an 18th-century Spanish colony, a fairly liberal rule. After the American Revolution, the hardy Western boatmen and traders from the fast-growing country between the Alleghenies and the Mississippi poured their produce into New Orleans in an ever-increasing stream and were continually exasperated at the heavy customs duties levied. Threats of Western secession on the one hand and of filibustering seizure of New Orleans by the Westerners on the other were equally alarming to the statesmen of the young American republic and to the governors of the Spanish colony.

The cumulative pressure on the federal government resulted in the American purchase of Louisiana in 1803 from the French, who had reacquired it by secret treaty from Spain in 1800 (*see Louisiana Purchase*). In 1804 Congress divided Louisiana into the District of Louisiana, north of latitude 33°, and the Territory of Orleans, south of that parallel. In 1812 the Territory of Orleans was admitted to the Union as the state of Louisiana, with the addition of the "Florida parishes"—that part of the Spanish province of West Florida lying between the Pearl and the Mississippi rivers, which had rebelled against Spanish rule in 1810.

Louisiana's vote of secession in 1861 brought into the Confederacy the largest city in the South, with more machine shops and trained workmen than any other. The state's command of the mouth of the Mississippi gave it great military importance. David Farragut's capture of New Orleans and Baton Rouge opened the lower Mississippi to the Federal forces (*see Farragut; Civil War, American*).

During the Civil War the portions of the state under Confederate and Federal control, respectively, were each organized with a state government. "Carpetbag" rule during the reconstruction period was more corrupt and extravagant in Louisiana than in most Southern states (*see Reconstruction Period*).

Louisiana was one of the Southern states which in 1876 elected two rival sets of presidential electors—one representing the White League government and the other the carpetbag element—and so brought on the Hayes-Tilden disputed election (*see Hayes*).

Freed of the financial misrule of the reconstruction period, the state was able to rebuild its prosperity, particularly since sanitarians controlled epidemics. (*See also* chronology in Louisiana Fact Summary; United States, section "The South.")

LOUISIANA PURCHASE. In 1803 President Jefferson set the example of acquiring new territory by purchase rather than by war when he bought from France the vast tract of land known as Louisiana. The United States did not differ from Old World countries in wishing to reach its "natural boundaries"; it did differ in the method it used.

The city of New Orleans was greatly desired by all the people beyond the Alleghenies, for the nation that controlled this spot could control the Mississippi River. Western farmers were anxious that this control should be in the hands of the United States, for their grain, hogs, cattle, and other produce were chiefly marketed by flatboats which floated down the great "father of waters."

Spain had held this important gateway to the West ever since 1762, when it was acquired by treaty from France. Then, suddenly, in 1802, news came that two years earlier Napoleon had forced the weak country of Spain to give New Orleans and the whole Louisiana territory to the all-conquering French. This was bad news for the Western farmer, for France was then the most powerful country in the world, and there was no hope of forcing from it any privileges.

But Napoleon's dream of a vast colonial empire vanished almost as suddenly as it had come. England renewed the struggle in Europe, and it was folly for France to try to hold territory across the Atlantic while England controlled the seas. Robert Livingston, the American minister to France, pointed out this fact to Napoleon. And despite protest, Napoleon decided to sell Louisiana.

When, therefore, James Monroe arrived in France with power from President Jefferson to buy New Orleans and West Florida for not more than \$10,000,000, he was offered the *whole* of the French territory for approximately \$15,000,000. Although the American agents had no authority to make such an extensive purchase, they signed the treaty of purchase on April 30, 1803. In December the French flag was hauled down and the Stars and Stripes were hoisted over New Orleans, as a sign that the domain of Louisiana had come under United States rule.

Thus at one stroke the area of the United States was doubled. President Jefferson believed that the annexation and government of so vast a territory was unconstitutional and wished to have an amendment to the Constitution adopted ratifying it. His cabinet did not think this necessary and their views prevailed. The New England Federalists were enraged at the prospect of the admission of numerous new states, whose votes in Senate and House would reinforce those of the South and West. Some, like Josiah Quincy, openly advocated secession—"amicably, if

they can; violently if they must." But the people generally approved of the purchase, as well they might. Thirteen of the 48 states now in the Union were included in the purchase either in whole or in part, and the value of this land lying between the Mississippi River and the Rocky Mountains is now many hundred times as great as the price paid for it. (See the map in United States History.)

LOUISVILLE, Ky. The Falls of the Ohio River determined the location of Louisville, the largest city in Kentucky. Actually the falls are great rapids. In pioneer days these treacherous rocks interrupted river traffic and forced upstream and downstream vessels to exchange cargoes over a portage. This transfer point soon became a trading center.

The completion of the Louisville and Portland Canal in 1830 ended the portaging business. But the Ohio River was now open to through traffic from Pittsburgh to the Mississippi, and the port of Louisville grew in commercial importance.

Louisville's industrial growth started soon after the Civil War. Its strategic location played an important part. To the north and west lay the great grain regions of the United States. To the south were abundant supplies of tobacco, cotton, and minerals. All these raw materials fed the many busy factories which spread to both sides of the river.

A huge hydroelectric plant at the falls and steam-electric plants provide abundant power. Coal, oil, and gas fields near by supply much of the city's fuel,

KENTUCKY'S GATEWAY TO THE SOUTH



This air view shows the downtown section of Louisville along the south bank of the Ohio River. At the top of the picture, a railroad bridge crosses the river to Indiana. The bridge also spans the eastern end of the Louisville and Portland Canal.

but some natural gas and petroleum are piped from West Virginia and Texas. Louisville is one of the nation's largest producers of liquor and tobacco products. Its huge chemical industry manufactures paints, varnishes, and synthetic rubber. Other factories make textiles, metal and lumber products.

Eight trunk-line railroads serve the city, which also contains large railroad headquarters and repair shops. Several air-transport lines use its two airports. A municipal highway bridge and three railroad bridges span the Ohio River to Indiana.

Louisville's parks and playgrounds cover more than 2,436 acres. Iroquois Park contains an amphitheater where summer operetta is presented. The J. B. Speed Art Museum is on the campus of the University of Louisville. This university is one of the oldest municipal colleges in the United States. It developed from Jefferson Seminary, founded in 1798. The famous race track, Churchill Downs, is in the southern part of the city. The Kentucky Derby has been run here every May since 1875.

Louisville was first called Beargrass Settlement. It was founded in 1778 by George Rogers Clark as a frontier outpost. When it was incorporated as a town in 1780, Clark named it Louisville in honor of Louis XVI of France. Many of its early settlers came from France, and later a number from Germany.

Among the city's famous people was the noted journalist, Henry Watterson, editor of the *Louisville Courier-Journal*. Others included Louis Philippe, later the "Citizen King of France," and Louis D. Brandeis, Supreme Court justice. George Rogers Clark is buried in a Louisville cemetery. The tomb of Zachary Taylor is in Zachary Taylor National Cemetery, just outside the city.

The city was incorporated in 1828. It is governed by a mayor and board of 12 aldermen. Population (1950 census), 369,129.

LOURDES (*lord*), FRANCE. A million pilgrims visit Lourdes each year. There, in 1858, in a grotto beside the River Gave, Bernadette Soubirous (*sq-bē-rō*) saw visions of the Virgin Mary and found a spring said to have healing powers. Today Roman Catholics from all over the world visit the famous shrine at Lourdes and receive water from the spring.

Bernadette, christened Marie-Bernard, was born Jan. 7, 1844. At that time Lourdes was a market town of about 5,000 people. Bernadette's parents, François and Louise, owned a mill inherited from Louise's father, but they lost it a year after Bernadette's birth. Then both François and Louise worked at odd jobs. When Bernadette was 12 the family went to live in a cell of an unused jail called "the dungeon."

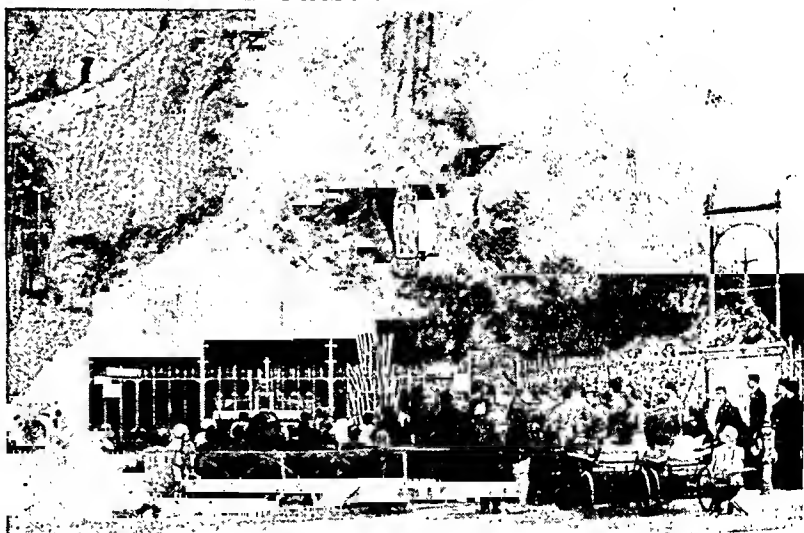
On Feb. 11, 1858, Bernadette, her sister Toinette, and a friend went to gather twigs for firewood. They wandered to the Gave, opposite a great rock known as Massabielle ("old rocks"). There, in a grotto, Bernadette saw a vision she later described as "a lady, young and beautiful." Similar visions followed, always in the grotto. Crowds began to gather about Bernadette when she went to Massabielle. During the ninth vision she uncovered a trickle of water which proved to be a spring. A blind stone-cutter bathed his eyes in the water a few days later and reported a miraculous cure. Twenty thousand people gathered at Lourdes the day of Bernadette's 16th vision. According to various historians, she saw 18 or 19 visions.

Bernadette Becomes a Nun

The grotto in Massabielle soon became a popular shrine. Police tried several times to close it, but Napoleon III ordered it left open. When Bernadette was 16 years old, she went to live with the Sisters of Charity. She took final vows with the order at Nevers in 1878. On April 16, 1879, she died of tuberculosis. She was canonized in 1933. Her feast day is February 18.

Today three churches grace Massabielle. Bernadette was present at the opening of the first in 1866. This is the Crypt, hewn out of the rock. Above it rises a spired basilica, Notre-Dame de Lourdes. Below it is the great round romanesque Church of the Rosary. A Way of the Cross with life-sized figures mounts the

THE WORLD-FAMOUS GROTTA AT LOURDES



A statue of the Virgin looks down upon pilgrims to Lourdes as they await their turn to approach the altar within the grotto. A pulpit stands at the right. In the grotto, and beside it, hang crutches left by cripples who have visited the shrine.

tree-covered hill to the left of the basilica. Down by the grotto are three low buildings where the sick can bathe in water from the spring. Twelve bronze hydrants also supply water. Inside the grotto is an altar. Hundreds of votive candles left by pilgrims burn in and around the grotto.

Lourdes is in the Pyrenes Mountains in southwest France. Population (1946 census), 12,421.

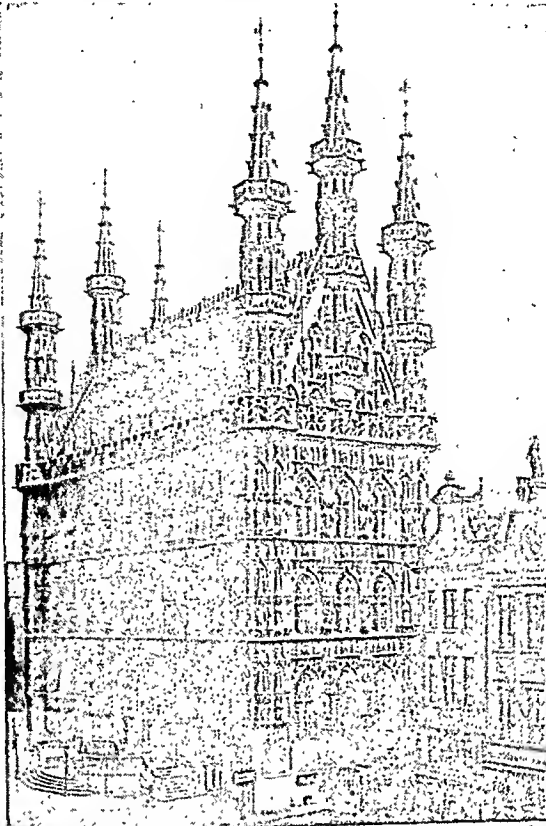
LOUVAIN (*lo-vān'*, Flemish *Leuven*), BELGIUM. In the 14th century the charming old town of Louvain on the Dyle River was the capital of the Duchy of Brabant and one of the leading cloth-weaving centers of Europe. A feud between citizens and patri-cians toward the end of the century led to the decline of its wool trade and to the rise of Brussels, 18 miles to the west. After the founding of its famous Catholic univer-sity in 1426, however, Lou-vain became a noted seat of learning.

Of the town's many beau-tiful old buildings, two are outstanding. The Gothic town hall and the church of St. Pierre, both built in the 15th century, are among the finest medieval structures in Eu-rope. In the 17th century the university was removed to the old Cloth Workers' Hall, an early 14th-century build-ing. One of the town's chief treasures was the university library, which contained many priceless old manu-scripts and early printed books. It was destroyed in August 1914, when the Germans set fire to the town. A new library built and endowed with a million-dollar

was fund contributed by Americans was opened in 1928. Its stock of 700,000 volumes came from sympathizers throughout the world and from Ger-many under the terms of the Versailles Treaty. In May 1940, only 12 years after it was rebuilt, the library was again destroyed during a German inva-sion. Population (1947 census), 36,640. **LOW, JULIETTE GORDON** (1860-1927). Girl Scouts in the United States cele-brate October 31 as Founder's Day. It is the birthday of Juliette Low, who organized the first Girl Guides in the United States at her home in Savannah, Ga., March 12, 1912. The Girl Guides soon took the name of Girl Scouts. Mrs. Low became their first president.

Mrs. Low was born in Savannah. Her father was Gen. William Washington Gordon. Her mother, Elea-nor Kinzie Gordon, is said to have been the first white child born in Chicago. Juliette went to private schools in Virginia and New York City. In 1886 she married William Low of Warwickshire, England. The Lows had houses in England, Scotland, and America. They were friends of Sir Robert Baden-Powell who had

LOUVAIN'S GOTHIC TOWN HALL



Light, soaring lines and elaborate ornamentation make this town hall one of the world's richest examples of Gothic architecture. It was built between 1448 and 1459.

founded the Boy Scouts, and of his sister, Agnes, who had established the Girl Guides in 1911. Mrs. Low organized the first troop of Girl Guides in Scotland.

Mrs. Low was a talented artist and helped to organize the Savannah Art Club. But her chief interest was the Girl Scouts. She was deaf, but she overcame the handicap so well that she was able to travel widely and interest people in the Girl Scout movement. After retiring as president, she received the title of Founder.

LOWELL, AMY (1874-1925). All her life Amy Lowell was a rebel. She came from the distinguished and conserva-tive Lowell family of Brook-line, Mass. She was the youngest of five children. Her brother Abbot became presi-dent of Harvard University. Another brother, Percival, was a noted astronomer. Their grandfather was a cous-in of James Russell Lowell.

Amy Lowell was educated at private schools and she traveled widely abroad. She was determined to express herself and at 28 she decided to be a poet. For eight years she studied techniques, then in 1912

published her first book of poems. In 1913 in England she met the imagist poets. She brought their theories back to the United States and fought to get their work published. In 1915-17 she edited 'Some Imagist Poets'. Her own later poems defied tradition, for they were in free verse. Perhaps her best known poem is 'Patterns'. Her works include 'Men, Women, and Ghosts', 'A Dome of Many-Coloured Glass', 'Pictures of the Floating World', 'Can Grande's Castle', 'What's O'Clock' (awarded the Pulitzer prize in 1926), and a critical life of John Keats.

LOWELL, JAMES RUSSELL (1819-1891). "If writing poetry were a profession I should be a poet," Lowell declared when

at 19 he was graduated from Harvard. Realizing that poetry alone would never earn him a living, he tried, though unsuccessfully, to follow the law. His friendship with Maria White was also a stim-ulus toward literature. Being a poet herself of no mean gifts, she sympathized with Lowell's tastes and encouraged him to continue writing. They mar-ried in 1840, and although for many years they had

JULIETTE LOW



This picture shows Mrs. Low in Girl Scout uniform.

little money, they were very happy. Lowell wrote some of his best poems, such as 'The Vision of Sir Launfal' and 'To a Dandelion' during this period.

There was another side to Lowell's nature which the stormy times just before the Mexican War could not fail to arouse. Believing that he saw the United States about to enter an unjust war for new territory, into which slavery might spread, he expressed his disapproval in a series of poems in Yankee dialect called 'The Biglow Papers'. These contain much of the moral force, sly humor, and close-packed phrases of the New England farmers and small-town people. To the period of the Mexican War also belongs Lowell's noble poem 'The Present Crisis'.

The busy productive years following Lowell's marriage were much shadowed by family afflictions. His wife, whose health had long been delicate, died in 1853. But his literary work had gained him fame, and in 1855 he was asked to give a series of public lectures in Boston. His success led to his being offered the professorship in French, Spanish, and general literature at Harvard. He accepted the chair but asked for the opportunity to go to Europe for a year in order to renew his knowledge of modern languages. On his return he married Miss Frances Dunlap, who had been acting as governess for his daughter, and settled down to a serene and busy life in which teaching and writing shared his attention.

In 1857 he became editor of the *Atlantic Monthly*. Even after resigning that post four years later, he contributed his poems largely to that magazine, his prose writings going to the *North American Review*. During the time that he was on the Harvard faculty, prose was his usual method of expression. He wrote largely travels, criticism, literary and political essays, including work of such keen insight that he has been ranked by many as America's leading critic. 'On a Certain Condescension in Foreigners' and 'Keats' are among his most refreshing and characteristic essays. His literary criticisms were particularly valuable because, like much of Longfellow's work, they helped acquaint Americans with Europe's literary riches at a time when growing interest in literature made the influence most valuable.

He did write some poetry in this period, however, and one effort is of very great merit. The 'Commemoration Ode', written in 1865 in honor of the Harvard soldiers fallen in the Civil War, is a stirring piece of work. He himself felt that he "had written something really good at last." The passage on Lincoln is one that we should not like to lose from American literature, so clearly does it express, along with his admiration for the great man of the people, Lowell's real love for true democracy. In 1877 Lowell was

called from his university work to become the United States minister to Spain, later exchanging this post for that to England. In the latter position he did much to bring the two countries more closely into sympathy. His charm of manner and his power of making clever impromptu speeches made him popular in British society.

The last years of his life were spent in Cambridge among his books and friends. He died honored as poet, essayist, and a man of distinguished public service, not only in America, but also in England, where his fame is kept alive by a memorial window and a tablet in the Chapter House of Westminster Abbey.

Among Lowell's prose works are 'My Study Windows' (1871); 'Among My Books' (1870); 'Among My Books, Second Series' (1876).

LOWELL, MASS. One of the oldest of the great American industrial cities, is Lowell. It was founded in 1822 by the Merrimack Manufacturing Company and was named for Francis Cabot Lowell, who originated cotton manufacturing in America (*see* Textiles). This corporation bought a site at the junction of the Concord and Merrimack rivers and set about harnessing the 32-foot falls of the Merrimack, drawing the water through five miles of canals to various mills. Later, water power was supplemented by steam power. Today the Lowell factories are operated mainly by power from hydroelectric and steam-electric plants.

Lowell has huge cotton mills; hosiery, underwear, woolen, worsted, felt, and carpet factories; and bleaching and dyeing works. In the 1920's Lowell lost some textile mills to the South, but other industries developed, including leather, electric wire and electrical appliances, foundry and machine products, printing, and textile machines.

Educational institutions in the city include Lowell State Teachers College and Lowell Textile Institute, the most famous textile school in America. The city's public schools also train textile workers. The artist James Whistler was born here, and his home is now an art museum. Lucy Larcom, famous as the "mill girl" poet, lived here and worked in the mills.

Lowell was chartered as a town in 1826 and as a city in 1836. It has the manager form of government. Population (1950 census), 97,249.

LOYOLA (*loi-ō'lā*), **IGNATIUS DE** (1491-1556). Until his leg was shattered by a cannon ball at the siege of Pampeluna (1521), the future founder of the Jesuit order and the greatest opponent of Luther's teaching was known only as a courtly Spanish nobleman and soldier. The reading of the lives of the saints during his long convalescence turned him from the quest of military glory and made him a soldier of Christ. His sword and dagger he hung up on the altar of a monastery chapel. His worldly garments he gave to the



JAMES RUSSELL LOWELL
Writer and Diplomat

poor, taking a pilgrim's dress of sackcloth and hempen shoes, with a staff and gourd. Seven hours a day he spent on his knees in prayer and thrice a day he scourged his wasted body.

With difficulty Loyola reached Jerusalem, but he was not allowed by the authorities to remain and labor there as he had planned. Back in Spain, at the age of 32, he again became a student to learn the Latin needed for his religious studies. The next ten years he spent at schools and universities in Spain and in Paris. Again and again he was suspected of heresy and was imprisoned—at times loaded with chains—by the Inquisition for teaching before he had completed the prescribed studies.

Meanwhile his plans were taking more definite form. He would found a "Society of Jesus"—spiritually drilled and disciplined like a military company—to combat heresy and do missionary work in heathen countries. The members should be bound by the monastic vows of poverty, chastity, and implicit obedience, but they should wear no distinctive dress and should not be tied down by minute monastic rules or unusual forms of discipline.

In 1534, at Paris, Loyola and his six companions formed the beginning of this organization. In 1540 its members received at Rome the sanction of the pope, and Loyola became its first "general" or commanding officer. The remainder of his life, until his death at Rome in 1556, was spent in working out, with infinite skill, the constitution of his order, and preparing it for that conflict with the Protestant Reformation in which the Roman Catholic church was to win back half the lands which it had lost through Luther's revolt. In 1628 Pope Gregory XV canonized him as St. Ignatius of Loyola.

One of Loyola's earliest associates was Francis Xavier (1506-52), a native of Spanish Navarre, who spent the last 11 years of his life as the first great missionary to the Indies, Japan, and China. (See also Monks and Monasticism; Xavier.)

LUBRICANTS. The worst enemy of machinery is friction. It wears out the metal, wastes power, and generates heat. So substances called lubricants (from the Latin word *lubricus*, meaning "slippery") are applied to the bearing surfaces of machinery, that is, the surfaces that rub against each other (see Friction).

Not just any oil or grease will do. If it lacks only one of the qualities of a good lubricant it may mean a ruined machine. A lubricant must have "wetting power" so it will spread easily over metal and penetrate between surfaces that are in close contact with each other. It must cling to the surfaces so that rapid friction will not rub it off. It must not evaporate or in any other way change its essential greasiness. Freedom from acid and grit is important, for these will corrode or scratch the bearings. Furthermore, a lubricant must not catch fire easily or become gummy at low temperatures.

The quality of a lubricant which makes it cling together and resist being squeezed out of a bearing is

called its *viscosity*. This is opposed to freedom of flow. So the two qualities must be balanced to suit the purpose for which the lubricant is being used. For heavy loads more viscosity is needed; for high speeds, more freedom of flow. Cold increases viscosity; this is why automobiles require different lubricants in winter and summer.

Most of our lubricants come from petroleum (see Petroleum). These range from very light oils to heavy greases. For very heavy machinery, greases are often mixed with graphite (see Graphite).

Animal and vegetable oils have been used as lubricants since long before the discovery of petroleum oils and greases. Oil from the head of the porpoise and dolphin oil are used in watches. Sperm oil from the head of the whale lubricates fine machinery. Tallow oil, lard oil, and neat's-foot oil (obtained by boiling the bones of cattle) are often blended with mineral oils. Among the more important vegetable oils used as lubricants are castor oil, olive oil, and those extracted from cottonseed, corn, and rapeseed. These too may be mixed with mineral oils.

LUCKNOW (*lūk'nou*). The city of Lucknow is situated in the northern part of the republic of India, 540 miles northwest of Calcutta. It lies on the winding Gumti River, a tributary of the Ganges. From a distance it presents a striking appearance with its gorgeous domes, cupolas, and minarets. Inside the city there are many parks, gardens, and monuments.

Lucknow has a fine medical school and hospital, a university, and several colleges. Skilled craftsmen make gold and silver brocades, embroidery, brass and copper objects, pottery, and beaten silver ornaments. The chief industrial establishments are paper mills, printing plants, and metalworks. The city is an important railway center and has large machine shops. Its population is 496,861 (1951 census).

The Siege and Relief of Lucknow

The British withstood a famous siege in Lucknow in 1857 during a rebellion of native soldiers (called *sepoys*) against rule by the British East India Company. At Lucknow on July 1 the rebellious sepoys forced a regiment of British troops under Sir Henry Lawrence to take refuge in the Residency and adjoining grounds of the company's chief commissioner. They were joined by British civilians, including women and children. Lawrence died from a wound a few days later. The small garrison, numbering only a few thousand men, held out against 10,000 sepoys for more than four months. At last the defenders saw the signals of Sir Colin Campbell, commander in chief of a strong relief force. Soon they heard his Highland regiments playing "The Campbells Are Coming". The sepoys lifted the siege immediately and survivors and rescuers quietly withdrew from the town November 17. (See also India.)

The ruins of the Lucknow Residency were preserved. They include remains of the governor's headquarters, stockades, and trenches. Other sites of historic interest are a number of imposing palaces built since 1800 by Indian rulers.

Turning FOREST TREES into LUMBER

LUMBER. Wood is one of our most important raw materials. From matches to telephone poles, from railroad ties to beautifully grained furniture veneers, wood itself and such wood-derived products as paper find countless uses in daily living. The forests of the world yield it all. The work of cutting down trees and sawing them into timbers and boards is called *lumbering*, and the boards and timbers themselves are called *lumber*.

Lumbering is a giant industry in the United States and Canada. Most of the United States supply of lumber is cut on the Pacific coast and in the belt of southern states that ranges from Georgia to Texas. The Canadian supply comes mainly from Quebec, northern Ontario, and British Columbia. For fine furniture American manufacturers import glossy hardwoods from Central and South America and from such far places as south coastal Asia and the East Indies.

Like other industries today, lumbering uses the best principles of science, management, and machines. However, the work in the forests still calls for strong men who can accept some hardships. Modern lumberjacks lead rugged and exciting lives. They are often the heroes of action-packed stories, but the true accounts of their lives are often as thrilling as fictional ones.

Beginnings of the Lumbering Industry

In American pioneer days, every man was his own lumberjack. Pioneer settlers valued their axes almost as much as their rifles. They had great skill at cutting trees and trimming logs into timbers, beams, and planks for their houses and furniture (*see Pioneer Life*). In 1631, at Salmon Falls River in Maine, the settlers started a sawmill driven by water power. However, sawmills did not become common at that time. The good transportation needed to carry sawed lumber to markets was lacking.

The tall New England pines made splendid masts for ships. Representatives of the British navy reserved these trees for their own use by blazing them with the "king's arrow." The colonists were forbidden to cut these marked pines. Resentment against this ban was one of the irritations that helped to bring about the American Revolution.

When transportation improved in New England in the early 1800's, large-scale lumbering began. Demand grew for the fine white pine in the Maine forests, and large numbers of men went into the woods to cut it. They felled the trees in winter and sledged or skidded the logs over iced roads to nearby river banks. In the spring they pushed the logs into the river, and the river current carried them downstream to the sawmills.

Some of the men were native New Englanders. Others were French Canadians—

"Canucks," the New Englanders called them. They were hardy, reckless men who could stand the rough life and hard work. When their season's work was done they were ready for a frolic or a fight. They gave lumbering a character which persists even today.

By the middle of the 19th century lumbering had moved to the forests of the Great Lakes states—Michigan, Wisconsin, and Minnesota. Some of the lumberjacks were old-timers from the New England woods. Others were Scandinavian immigrants who had been used to forest life and long winters at home.

Life in the Early Lumber Camps

By this time, lumberjacks had come to consider themselves giants among men. They boasted of their strength and of their skill in cutting trees and in the dangerous work of driving logs down rivers to the mills. They wore red shirts, bright plaid mackinaw coats, and tasseled caps. They chose this riot of color both because they liked it and to protect themselves against being shot by careless hunters.

OLD-TIMERS AND THEIR GEAR



These men have a two-man saw, kerosene for oiling the saw, a wedge to aid the cutting, and double-bladed axes. Axes are still used, but modern lumberjacks have power saws and sometimes wear safety helmets.

For bunkhouses the lumberjacks made log cabins deep in the woods. They kept the cabins warm with roaring open fires. They slept in bunks built two or three tiers high around the walls, using straw tick mattresses for bedding.

The cookhouse provided ample, coarse food—salt pork and beans, bread and molasses, and hot, strong tea. The cook enforced the old-time rule, "silence during meals." The men did not mind, for they were too busy eating to talk. They ate breakfast before dawn and were ready to work as soon as it was light. They worked as long as daylight lasted, stopping only for lunch, which was brought to them in the woods.

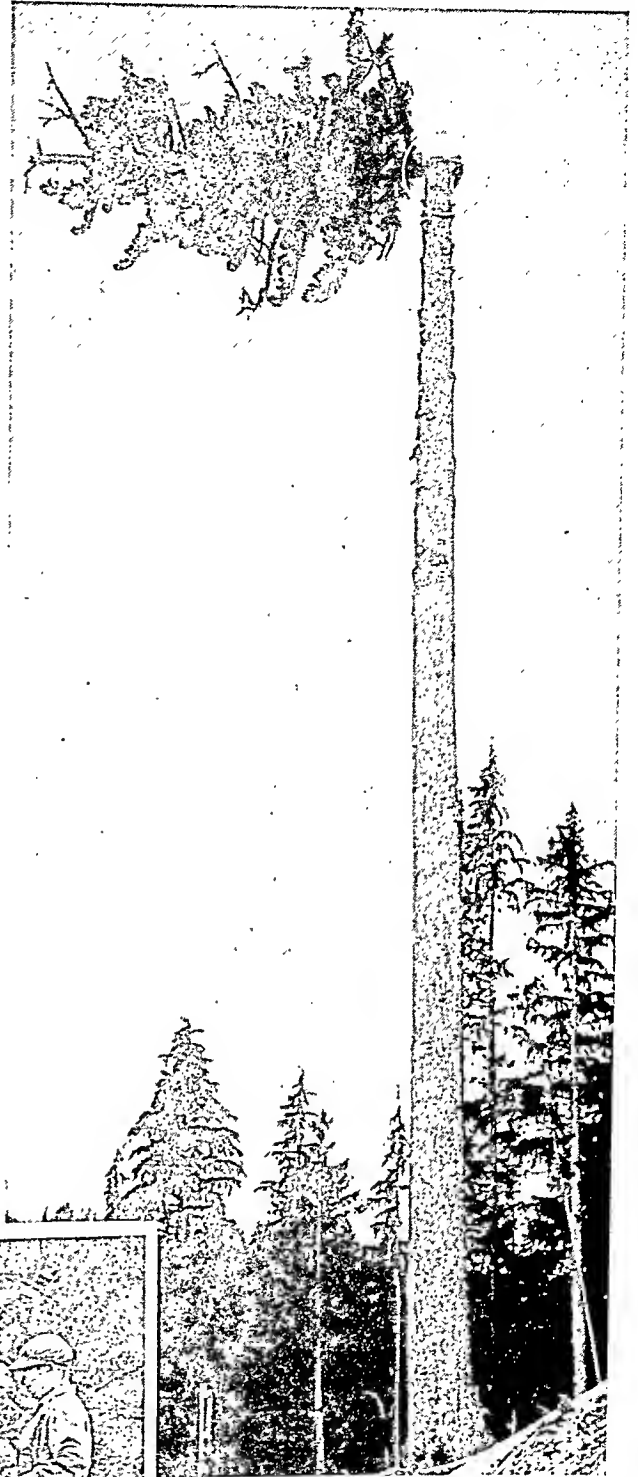
A separate shack housed the foreman, or "bull o' the woods," and the camp clerk. The clerk kept the records and accounts and ran a small store to supply the men who were away from town for months at a time. He stocked such items as mackinaw jackets, heavy woolen underwear and socks, shoe packs (a kind of moccasin shoe), and snuff (which lumberjacks called "snoose").

The lumberjacks spent evenings and Sundays in the bunkhouse playing cards, mending or whittling, and telling yarns. Their favorite stories concerned the brave life and tragic death of some lumberjack hero. Out of these bunkhouse yarns and ballads came a series of "tall tales" about Paul Bunyan, an imaginary lumberjack of fabulous size and strength (*see* Bunyan, Paul; Folklore). Exaggerated as the stories are, they give a good idea of how the early lumberjacks lived and worked. The stories have made a rich addition to American folklore and literature.

The Modern Lumbering Industry

Modern lumbering has brought many changes. Villages have grown up near many forest areas, and in these the lumberjacks make permanent homes. Buses carry them to work each morning and return them each evening to their families. Only in parts of Canada, Maine, and New Hampshire do men still live deep in the woods and work as the early lumberjacks did. In

WORK IN A WESTERN FOREST



Above, a "high climber" lumberjack (shown in the white circle) is cutting off the top of a tall tree. From the topped tree (now called a "spar" tree) cables will be slung for use in dragging logs from the woods to a central point.

Left, two Western lumberjacks are cutting down a tree with an electrically powered saw. Power comes through the cable from a portable electric generator. With their axes they have already notched the tree on the opposite side to guide the direction of the tree's fall.

OLD AND NEW IN LUMBERJACK LIFE



In the old days, lumberjacks often ate their noon meals outdoors. In winter a sleigh brought the meal from the cookhouse.



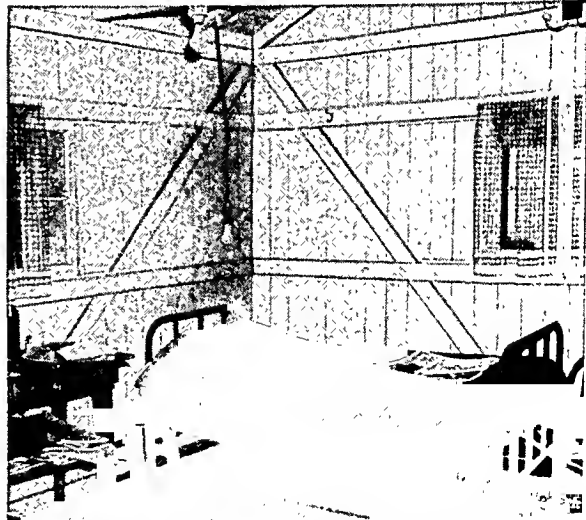
Today they eat all their meals in a large dining room. Lumberjacks work hard and they need plenty of hot, nourishing food.

these northern forests much of the work is still done in winter. The logging camp consists of shacks or cabins almost buried in the deep snowdrifts. However, the men have their own rooms, and electricity is supplied from temporary lines or portable generators. The men are still somewhat isolated, but their loneliness is relieved by radio and regular mail service.

Perhaps the greatest change in logging operations has been in the lumbering industry's attitude to the forests themselves. In former years they cut down all the trees in an area and moved on. Vast stretches of timber were stripped without regard for future growth



The lumberjacks slept in double-deck bunks in a one-room bunkhouse. They spent evenings talking or reading by lamplight.

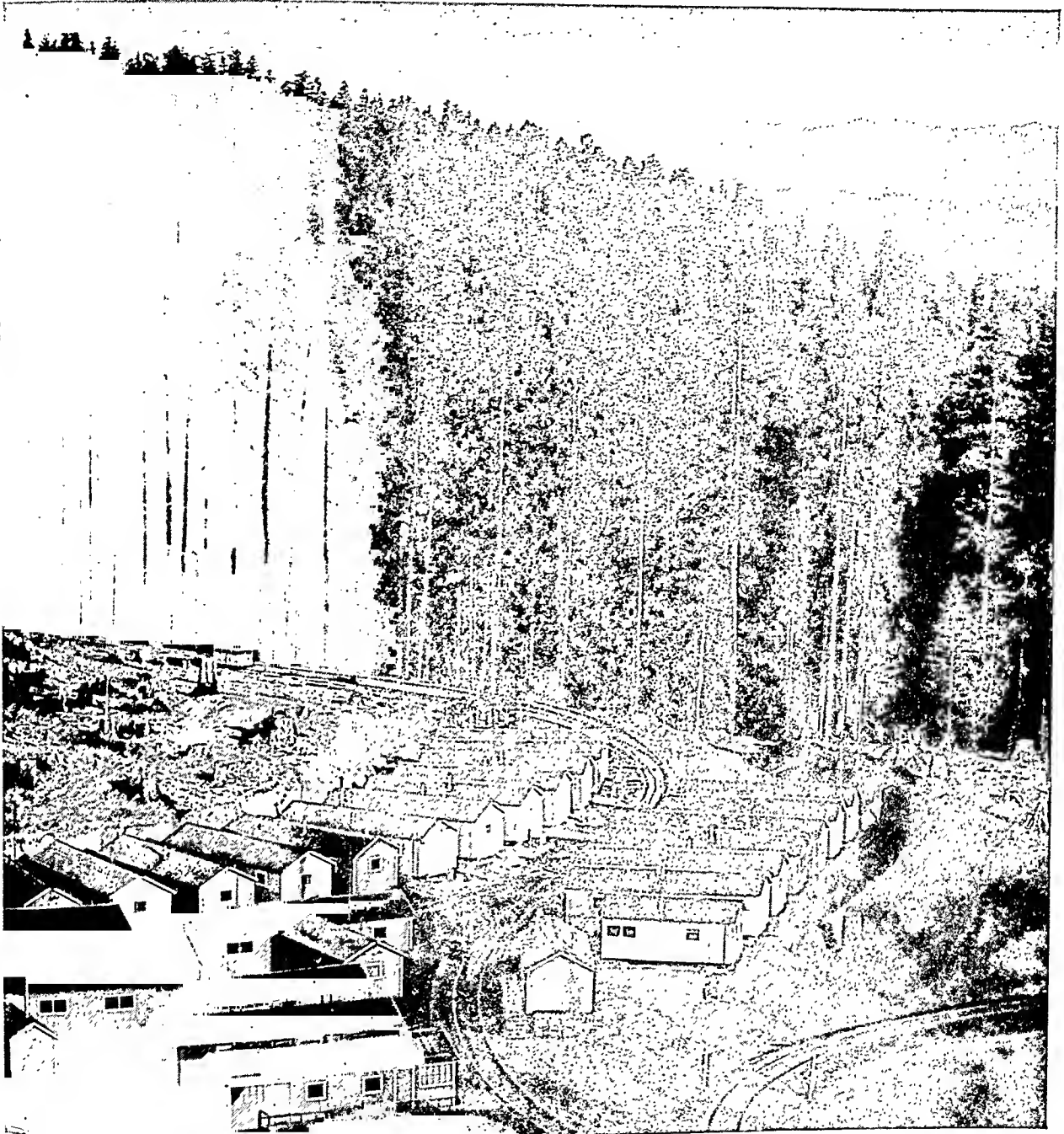


In many lumber camps, each man has his own room. Rooms are lighted by electricity and furnished simply but comfortably.

or use of the land. Small trees were felled with the large ones or were broken by the crushing fall of the big trees. Unusable fallen trees were left to create dangerous fire hazards. They "mined" trees as minerals are mined, without thought of replacement or of future growth.

Today lumbermen consider the forests as "tree farms" and lumber as a crop. They cut only the mature trees and give the young saplings a chance for full growth. They make sure that a tract of timber has a chance to reseed itself, or else they plant seedlings that were started in a tree nursery. Most lumber com-

A MODERN LOGGING CAMP IS A NEAT VILLAGE



A stand of huge Douglas firs, with Mount Rainier beyond them, gives this Washington State logging camp an attractive setting.

The houses are portable and can be moved to the next camp by flatcars or tractors when the nearby timber has been cut down.

panies have long-range reforestation programs. They have even gone back to once-abandoned, cutover tracts and replanted them. They encourage farmers to devote part of their land to raising a tree crop. This encouragement takes the form of soil analysis, supplying free or at low cost the right seedlings for the farmer's particular soil needs, lending planting equipment, and advice on harvesting the tree crop. Papermills often sponsor the same far-seeing programs to ensure a continuing supply of wood for making paper pulp. The federal government and the states cooperate in this work.

Lumbermen have largely dispelled the notion that first-growth, or virgin, stands of timber ought to be preserved. They point out that trees once past their prime are actually harmful. They die, and thus make fire hazards, and they come crashing down on younger trees. Lumbermen feel that properly logged forests actually conserve and increase the nation's timber resources. (See also Conservation; Forests and Forest Protection.)

Each section of the country has its own logging methods, based largely on the kinds and sizes of trees and the density of growth. The largest trees



The Southern states are important wood producers. Sometimes they employ logging methods not practiced in other lumbering regions. The picture above shows a Florida worker cutting a

pulpwood log into lengths suited for papermaking. He is using a circular power saw that can also be used for felling a tree. The belt-driven saw gets its power from the small gasoline motor.

and thickest forests grow in the Pacific Northwest, and there we can study the most spectacular and interesting logging methods.

Logging in the Pacific Northwest

Actual logging begins as a timber cruiser travels ahead of the lumberjack crew and determines the stands ready for cutting. Once the crew is ready to work in the stand, the foreman marks the trees which have reached full growth. The others are protected.

The bull o' the woods directs all logging work in the forest. The lumberjacks who work under him usually perform specialized jobs and take great pride in their skill. The *fallers* cut down the trees, and the *swampers* cut away the branches. Then the *buckers* saw the trees into logs of standard length.

The fallers work with two-man saws, seven feet long. Most of them now use power-driven saws, with power coming from an electric cable or a small gasoline motor attached to the saw. Before sawing, the fallers *undercut* (notch) the trunk with their axes on the side where they want the tree to fall. Then they begin sawing on the other side. By controlling the direction of fall, they can prevent the tree from damaging the surrounding younger growth. A pair of skilled men can undercut a tree so accurately that they can make the upper part of the falling tree drive a stake into the ground.

While sawing, the fallers drive iron wedges into the cut to prevent the weight of the tree from pinching the saw. From time to time, they sprinkle a few

drops of kerosene on the saw to prevent binding. Shortly before the sawcut reaches the notch, the tree starts to lean in the direction of the notch and then comes crashing down with a rush and a roar. The fallers move to the next selected tree, and the swampers step in to trim off the branches.

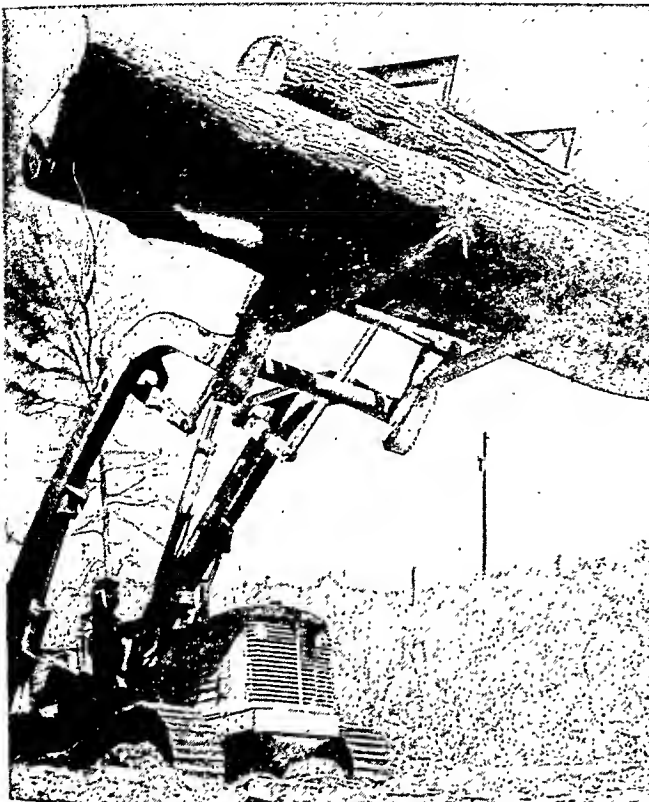
Next come the buckers, with six-foot single-handled saws. Theirs is a responsible job. They must see that a minimum of the tree is wasted as they saw it into sections. The head, or *bull*, bucker helps them decide on how to divide the tree into usable lengths for the sawmill.

Collecting Logs at the Landing

After the logs are cut they may be hauled to a central place for loading on railroad flatcars or trucks. This place is called a *landing* or a *side*. The logs are dragged to the landing by a tractor (*snaked*) or by an overhead cable (*skidded*). Setting up the cable, called a *skyline*, is one of the most spectacular and dangerous jobs in all logging work.

First, two of the tallest trees are selected for *spar* trees. One tree, the *head spar*, is near the landing; the other, the *tail spar*, is in the center of cutting operations. The spars may be as much as 2,000 feet apart. A *high climber* wearing climbing spikes and leather harness ascends each tree and cuts off the leafy top, or crown. This is particularly hazardous, because as the crown falls the tree whips violently from side to side. The high climber must harness himself to the spar and hold on with all his

WORK IN THE SOUTHERN UNITED STATES



This tractor-treaded skid loader has scooped up several logs and is carrying them to a truck that will haul the logs to a sawmill. The work is taking place in an Alabama forest.



Controlled burning to kill tree blights and insects is taking place here. Palmettos and other underbrush burn away. Young pines are left virtually unharmed and will grow to full height.

HAULING CEDAR LOGS FROM A WASHINGTON FOREST



Big cedar logs cut in the forests of the Pacific Northwest are often too heavy to be handled by the skid loader shown in the picture at the top of this page. Here a tractor with a special

hoist and cable attachment snakes them out of the deep woods. Other cables bring single logs to this central place in the forest where the tractor can pick up its load of many logs.

strength. On a second trip up each tree, he attaches the skyline. The spars are then braced with cables.

The logs themselves are skidded by a block and cable arrangement that travels along the skyline. The cable descending from the skyline is called the *skidding* line, and the noose that holds the logs is called the *choker*. Small steam engines provide the power for pulling the block and skidding line. Other engines are used to pull logs within reach of the choker and to operate derricks or cranes for loading the logs. In *high-lead* logging only one spar is used and the logs are dragged along the ground. Some lumbering companies use electric motors or diesel engines instead of steam.

A large crew is needed for these log-gathering operations. At the tail spar are the *choker setters*, who fasten the noose around the logs. The *whistle punk* signals the workers at the other end. These men are directed by the *rigging slinger*. At the landing are the crew who run the machines and handle the loading. The *skidding leverman* operates the skidding cable, and the *loading leverman* runs the derrick that lifts the logs on to the cars. The *chaser* unhooks the logs from the choker, and the *head loader* fastens the derrick tongs around the logs. On the car the *tong shaker* unfastens the tongs. Their chief is the *hook tender*. All these men must act as a well-organized team, for a slip on anyone's part might mean serious injury for a fellow worker. Lumbering ranks high on the list of hazardous occupations, but the annual accident rate is decreasing.

Sending Logs to the Sawmill

Logs usually travel all the way to the mill by flatcar or truck. In a few lumbering areas they are carried to a river and floated the rest of the way down. In winter the logs that go by water are piled on a high bank. When the river ice melts in the spring, the logs are pushed into the water.

Guiding the logs down the river are a group of daring and nimble *rivermen*. The riverman must be able to leap safely from log to log and balance himself on a log while it floats swiftly with a strong current. He wears heavy spiked shoes, and he uses a hooked pole, called a *peavey*, to push or separate the floating logs. The riverman also uses the peavey as a balancing pole.

Sometimes one log hits an obstruction and stops. Then others rapidly pile up on it and form a *jam* that barricades the river. When this happens, the rivermen team up and "bust the jam." They attack the

STRUGGLING TO "BUST THE JAM"



When logs pile up on their way downstream, rivermen must work furiously to break the jam. Here they are attacking

the key log with their hooked peaveys. Removing the key log allows the whole pile to straighten out and move along.

jam with their peaveys and break loose the key log. This often means hours of backbreaking work and frequent spills in the icy water. On wide, slow-moving streams, the logs are lashed together into giant rafts and pushed downstream by river tugboats.

Turning Logs into Lumber at the Mill

Whether the logs travel by rail, truck, or water, they usually end up in a pond at the foot of the sawmill. Here they are stored until the mill is ready to receive them. The logs are kept in ponds rather than on dry land, because the water-borne logs are easier to sort. The water also helps prevent deterioration during the waiting period. Many sawmill ponds are steam heated to prevent freezing. These are called *hot ponds*. When freezing threatens unheated ponds, the logs are hauled up on the banks.

Each log is pulled up from the pond into the mill by a spiked conveyer belt called a *jack ladder* or *jack chain*. On the way up the log is sprayed with powerful jets of water to remove gravel and grit that might injure the saws. If the log is too long, a huge cir-

RAFTING ON THE WHITE SALMON RIVER



To speed up the passage of logs down a broad, slow-moving river, the logs are often fastened loosely together in raft form and pushed downstream by tugboat. Here a large raft moves down the White Salmon River in Washington.

cular *deck saw* at the end of the jack ladder cuts it to usable size.

In the mill the bark is trimmed off and the log is cut lengthwise into boards and squared timbers (called *cants*). The man in charge of these cutting and trimming operations is the *sawyer*. The sawyer is responsible for getting the most out of the log. He must cut the log to take best advantage of the grain and to avoid knots wherever possible. Often he decides to turn one log into boards and cants of several widths and thicknesses.

The machine that turns the log into lumber is called a *head rig*. It consists of a giant band saw (the *head saw*) and a long, flat carriage for carrying the log. The carriage shuttles back and forth and moves the log against the saw for cut after cut. Mechanical steel arms turn the log as needed, then hold it in position. The head rig controls are actually operated by a worker called a *setter*. He receives his signals from the sawyer. The head saw is changed as often as necessary for inspection and sharpening.

From the head rig the boards and cants travel to different kinds of saws for further cutting and shaping. One saw, called a *gang saw*, has many blades for cutting a cant into boards. An *edger* cuts (rips) the boards lengthwise, and a *trimmer* cuts them crosswise. A *rotary saw* cuts out knotty sections from long boards and leaves them in short, clear sections.

Drying and Trimming

The boards still contain much of their natural moisture as well as water which they have soaked up while in the pond. For their next treatment, then, the boards are sent to *dry kilns*. There superheated steam passes over the boards and removes excess moisture. From the kilns the boards are taken to cooling sheds for further seasoning. Sometimes the boards are merely stacked in the open air to dry.

Sawed boards have rough surfaces. They are smoothed and made ready for final use in the planing mill. In the last step, the boards are inspected and graded, then stacked in the mill yards to await shipment.

Products Other Than Lumber

Not all logs are sawed into boards and cants. Some are cut into thin sheets for veneer and plywood. The logs may be sliced into sheets in straight cuts or they may be "peeled" by rotary cutting. In the latter process, the log is held in a device resembling a lathe. As the log turns, a sharp knife peels off a continuous ribbon of wood. Depending upon the

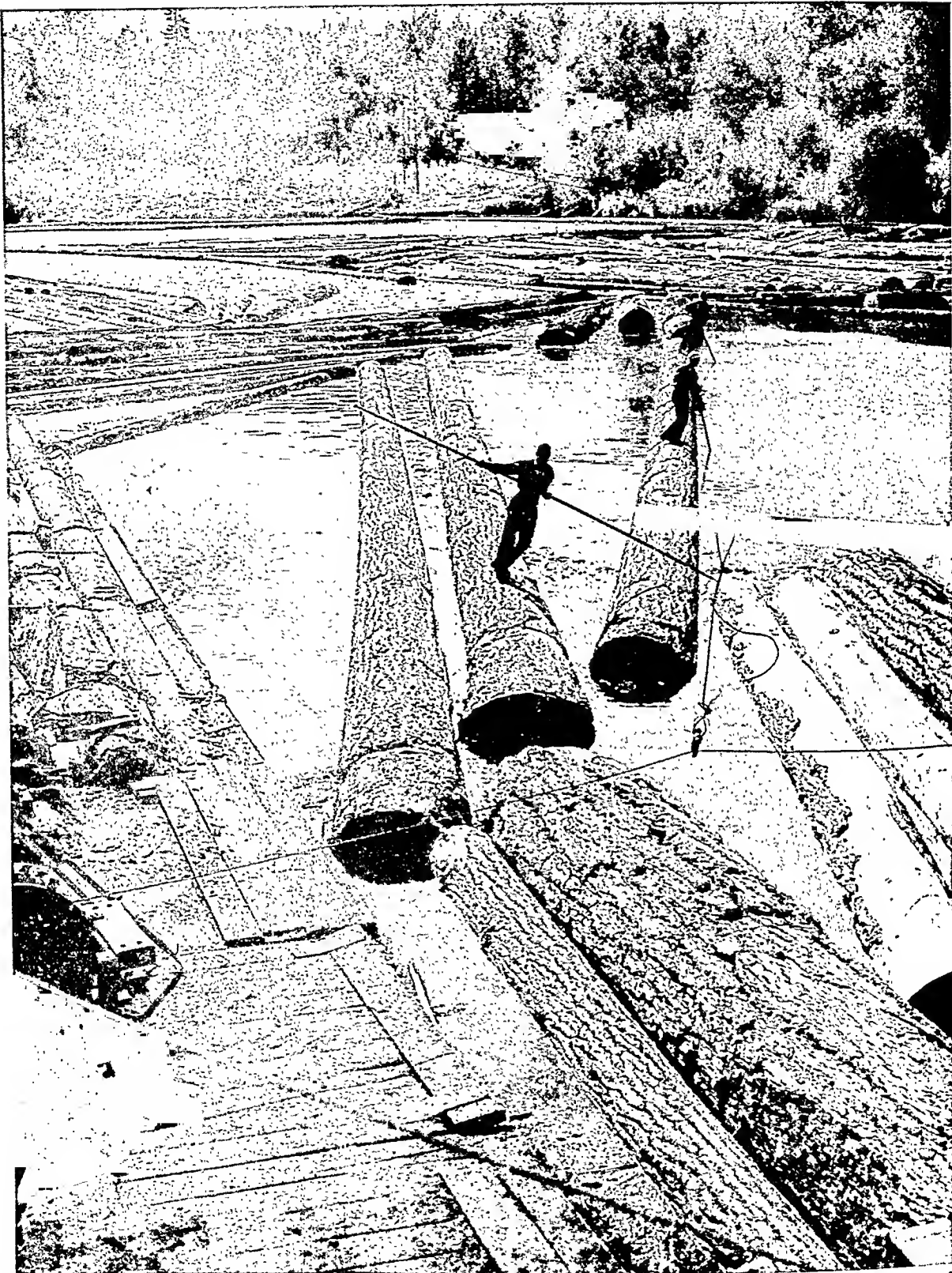
kind of wood and the grain of the cut, it may be used for furniture surfaces or built up in layers as plywood (see Plywood; Veneer).

Many logs go into the making of paper pulp, especially for newsprint and kraft paper (see Paper). Coniferous trees (cone-bearing species, such as pine and spruce) are mainly used for these pulps, although some hardwoods also go into kraft pulps. The bark is removed by rotary cutting or by jets of water under tremendous pressure. Then the logs are cut into small chips. Similar wood pulps are prepared for plastic materials. Turpentine and resins (called *naval stores*) are valuable by-products of lumbering operations (see Resins; Turpentine).

World Supply of Lumber

Despite intensive cutting in many areas, the world supply of lumber is still huge. Reforestation and other modern lumbering practices have actually increased the available timber resources in many areas of the United States and Canada. Vast stands of trees that have never been cut (virgin forests) exist in

A WATER STOREHOUSE AT THE MILL DOOR



Whether logs travel by rail, truck, or water, they often end up in a pond at the foot of the sawmill. They are "stored" here rather than on dry land because the floating logs are easier to sort. The water also helps prevent deterioration of the logs. Many sawmill ponds are steam heated to prevent freezing. When freezing threatens, the logs are hauled out.

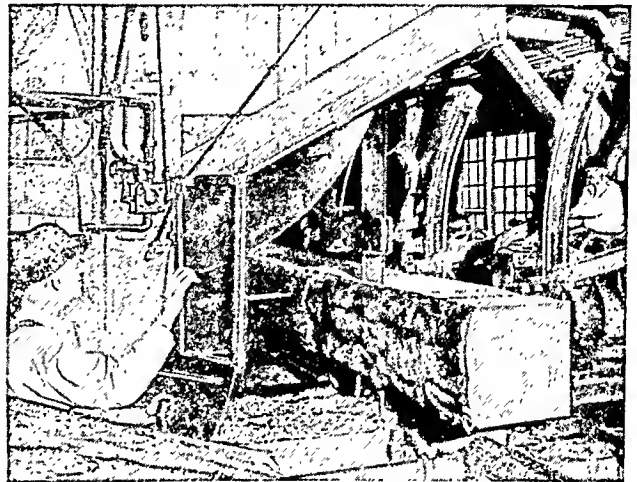
CHANGING LOGS INTO BOARDS IN THE SAWMILL



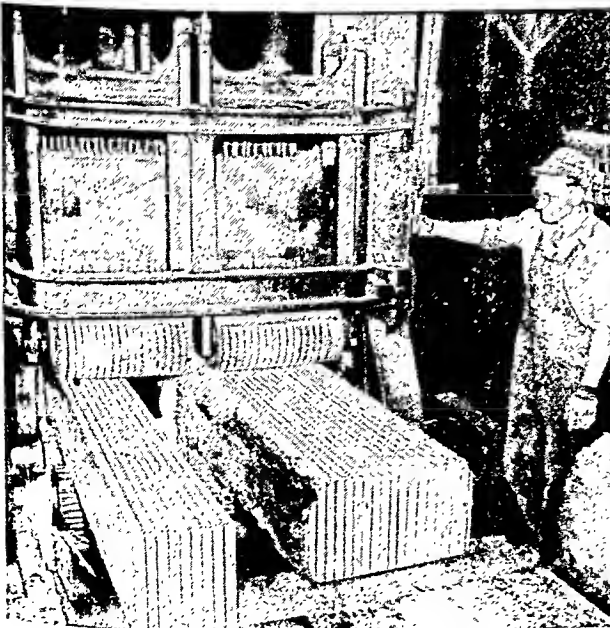
Here a log is being hoisted up an incline by a conveyer belt called a jack ladder. As the log rides up it is sprayed by water jets to remove matter that might injure the saws.



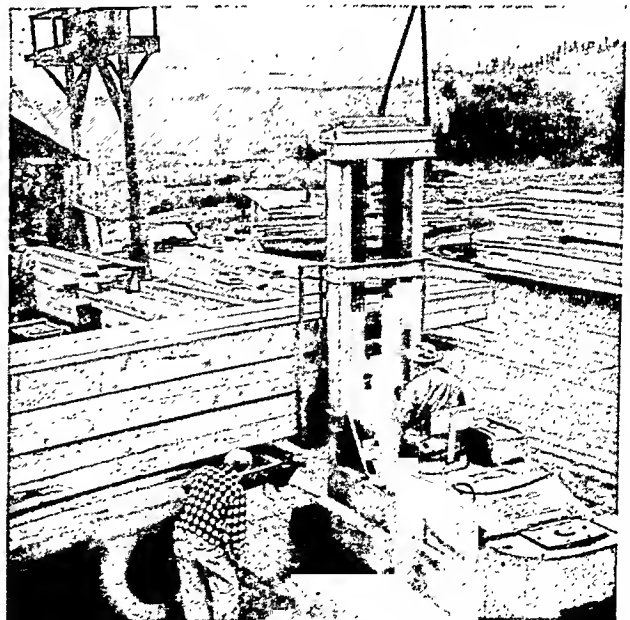
Inside the mill, logs are sometimes debarked by other jets of water. The bark-free logs are cut into boards and cants. Slabs and edgings are sent to pulp mills for papermaking.



Here an unbarked log is sawed into a square timber. At left is the sawyer. He directs the work of the head rig, which includes the band saw and the moving bed holding the log.

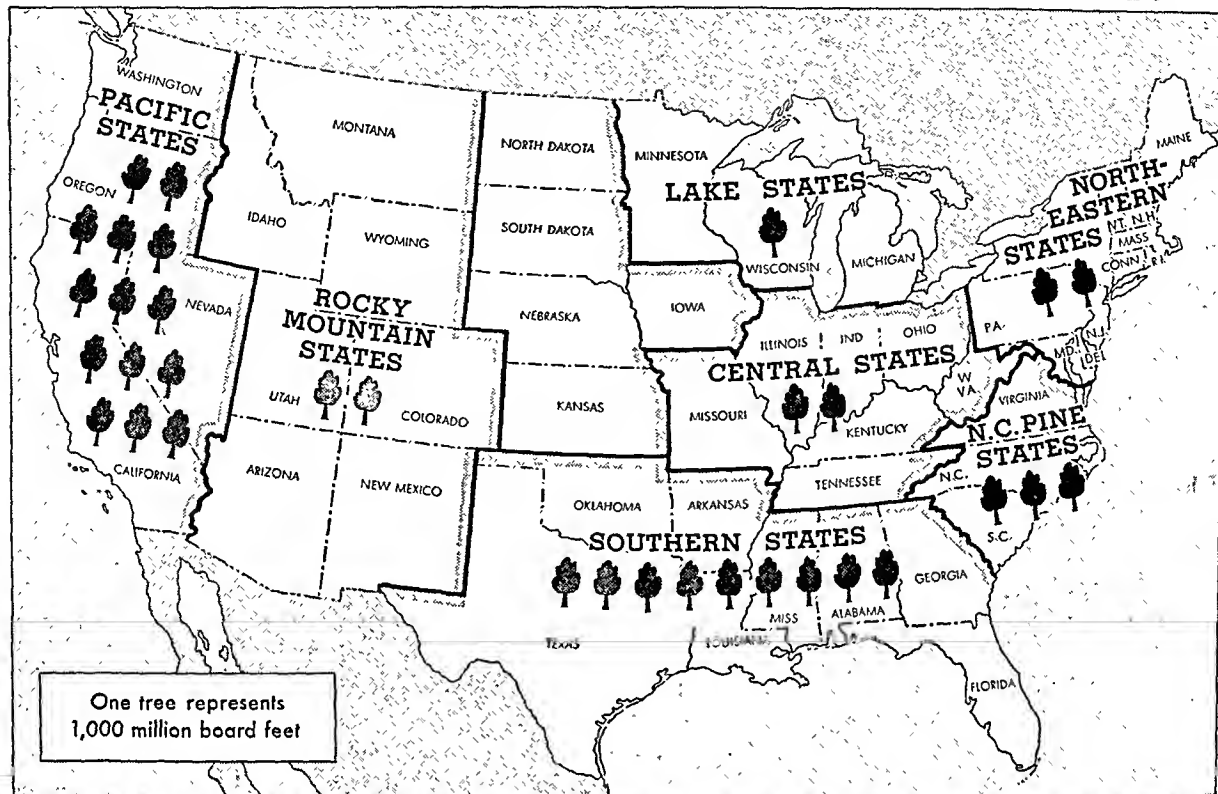


This type of saw is called a gang saw. Its many blades cut a whole timber into boards in one operation. The piece with bark on it will find use as fuel or in making a by-product.



This fork-lift truck moves boards in the mill lumber yard. Its carrying platform can move up the vertical frame to reach high stacks and down to lower the boards to ground level.

LUMBER PRODUCTION BY REGIONS IN THE UNITED STATES



Here are the important lumber-producing regions in the United States. Each tree symbol represents 1,000 million board feet produced in an average year. (A board foot is a unit of wood one

foot long, one foot wide, and one inch thick, or its equivalent.) The wood may be used as whole logs, as lumber, or as pulp-wood for papermaking and other products of wood chemistry.

many places, such as Siberia and the interiors of Africa and South America. Unhealthful working conditions or lack of transportation has prevented logging in these valuable forests. Thus the way remains open for bold and resourceful men—men who are willing to tackle the same problems encountered in building the Panama Canal and the Alaska Highway.

Coniferous forests are spread over the whole northern areas of the continents of North America, Europe, and Asia. The coniferous belt also extends down the western side of North America from Alaska to Mexico; and another great area covers the southern gulf and coastal states of the United States.

Temperate-climate hardwoods are found in the central states of the United States and in scattered regions in Europe. Tropical hardwoods grow in most of South America, Africa, southern India, Burma, Siam, Malaya, and the East Indies. These tropical hardwoods are prized for their beautiful grains and glossy finishes. They are far more valuable than most coniferous woods and temperate-climate hardwoods.

Future of the Lumbering Industry

Today lumber is in greater demand than ever before. At one time, steel, brick, and concrete threatened to displace it entirely as a building material; but the handsome appearance of wood still keeps it in demand for homes.

It is still unsurpassed as a furniture material. Such common uses as railroad ties, fence posts, crates,

and telephone poles take a great part of the annual lumber production. Scientists continually find new ways to impregnate wood with various chemicals for greater strength and durability. Other chemicals, forced into the lumber under high pressure, make it fire-resistant and waterproof. Still other chemicals preserve wood against termites and fungi which cause rotting.

Wood wastes were once considered a nuisance and were disposed of in the cutting areas or in the mill by burning. Now they are turned into profitable use. The wastes are cut into small chips, then reduced by steam pressure into minute fibers. The fibers, together with a binder, are pressed into board shapes which are durable and easily worked. They are light, grainless, and have excellent insulating qualities. These man-made boards appear on the market under various trade names. Other wastes are crushed under tremendous mechanical pressure, and the compressed material is cut into convenient lengths and sold for fuel.

The use of wood cellulose for plastics is constantly growing (*see Plastics*). One of the most important of these wood cellulose products is rayon (*see Rayon*). Research chemists are now finding many uses for *lignin*, a substance which was formerly discarded as a waste product of the papermaking industry. Wood and wood products are discussed in greater detail in the article on Wood.

LUNGS. All living animals must absorb oxygen and eliminate the waste gas carbon dioxide. In many of the highly developed air-breathing animals, including man, the two processes are performed in special organs called the lungs. From species to species, lungs vary in size and shape but are strikingly similar in structure.

The function of the lungs is to provide a place where oxygen can reach the blood and carbon dioxide be removed. They are so constructed that a very large surface is available for the transfer. It has been estimated that the total surface area in adult human lungs is equal to approximately 100 square yards—an area larger than a baseball infield. Beyond providing this surface and tubes for air to reach this surface, the lungs themselves do not actually contribute to the act of respiration. They are passive.

The pair of lungs is in the chest cavity, or *thorax*, one lung on each side. Each lung is shaped somewhat like a cone with its broad base resting upon the surface of the diaphragm. A thin membrane, called the *pleura*, covers each lung. Lung tissue is soft, light, and spongy in texture and remarkable for its elasticity.

Between the lungs are the heart and the major blood vessels. The many tributaries of one set of these big blood vessels—the *pulmonary arteries* and *pulmonary veins*—make up the vascular portion of the lungs.

The windpipe, or *trachea*, unites the two lungs. About halfway down the chest, the trachea divides into a right and a left *main bronchus*. Each main bronchus enters a lung and there it divides and re-divides into smaller and smaller air passageways. The trachea, main bronchi, and smaller bronchi are often called the *bronchial tree*.

The smallest bronchi open out into tiny balloonlike pouches, called *air sacs*, or *alveoli*. There are several million of these. Around each tiny alveolus are wrapped *pulmonary capillaries*, the smallest blood vessels of the lungs. The absorption of oxygen into the blood and the elimination of carbon dioxide from the blood go on between the tremendous surface of the thin-walled alveoli and the equally thin-walled surrounding capillaries.

Air on its way to the lungs is first warmed, moistened, and cleansed in the nose and pharynx before reaching the bronchi. All the bronchi are lined with special cells that have tiny oarlike projections called

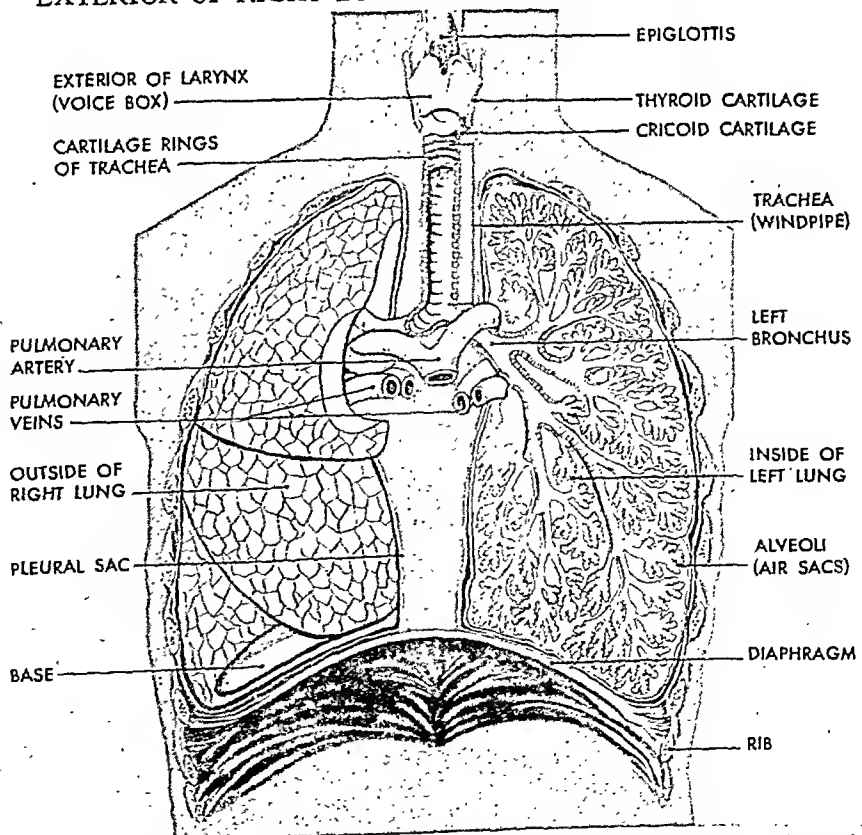
cilia. The many millions of cilia move constantly in unison, fanning dust and dirt that are inhaled back to the nose and mouth. Some dust and dirt, however, remain permanently in the lungs and darken them. Children's lungs are always very pink. Adults' lungs vary in the degree of darkening, depending upon the cleanness of the air usually breathed. This apparently harmless color change is most pronounced in those persons who smoke and in those who live or work in dusty places. The color change is called *anthracosis*.

The main muscle for breathing is the diaphragm. Its motion as a whole is almost as much forward as downward and is most effective in ventilating the lower lobes of the lungs. This method of breathing is called *abdominal*. The ribs also contribute to breathing by rising and increasing the chest area. This method of breathing is called *costal*. Both methods are normally operative at all times.

Adult human lungs hold from three to four quarts of air. During quiet breathing, a person normally inhales about one pint of air with each breath. When very active, as when running a race, one may inhale six times as much air with each breath and also breathe much more rapidly to provide the needed oxygen.

(For a description of the mechanical and chemical processes of the interchange of oxygen and carbon dioxide, see *Respiration*. See also *Blood*.)

EXTERIOR OF RIGHT LUNG AND INTERIOR OF LEFT LUNG



A part of the right lung has been cut away to show how the large air ducts and blood vessels enter the lungs. (Blood vessels inside the lungs are omitted.) The surface of the lungs is smooth and marked out by elastic fibers into numerous many-sided areas. The interior of the left lung shows how the bronchi divide into smaller and smaller branches that end in thin-walled air sacs, or alveoli (shown here much magnified).

WHEN LUTHER BURNED THE POPE'S BULL



This incident marked the most dramatic moment in Luther's break with the church of Rome. It took place in Wittenberg, Saxony, on Dec. 10, 1520. Messengers from the Pope had brought an official proclamation or "bull" condemning Luther's new teachings, and calling upon him to retract under pain of excommunication and other punishments for heresy. Luther, who had learned that messengers were on the way, had called together the students of the University and when the bull was delivered to him he cast it into the flames.

LUTHER, MARTIN (1483-1546). "Here I stand; I can do no other; God help me! Amen!" These are the words which tradition puts into the mouth of the monk Luther in the year 1521, in the memorable scene in the bishop's palace of the quaint old German city of Worms, on the river Rhine, when he was called to account for his religious teachings. Though it is highly probable that he did not use these words, they nevertheless sum up fairly well the spirit of the long and elaborate reply which, after some preliminary hesitation, he made to the assembly.

The young emperor Charles V had just come into his German dominions from Spain, and was holding an assembly or "diet" to regulate the affairs of Germany. Among other weighty topics was the question what to do with Luther, professor in the elector of Saxony's University of Wittenberg, whose religious teachings, although formally condemned by the Pope's bull in 1520, still continued to set Germany afire. Even the Pope's representative, Alexander, who was there to demand

that Luther's books be burned and their author sent to Rome for punishment, recognized that there were difficulties. "All Germany is in commotion," he wrote his master. "Nine out of every ten cry 'Luther,' and the tenth, if he does not care for what Luther says, at least cries, 'Death to the court of Rome!'"

When faint-hearted friends had counseled Luther to distrust the emperor's safe-conduct to Worms he had replied, "Though there were as many devils in Worms as there are tiles upon the roofs, I will go there."

The refusal which Luther gave to the demand that he recant his books was followed by the Edict of Worms, issued by the Emperor May 25, 1521. It condemned Luther and called upon all persons to seize him and give him up to a heretic's death; and his books also

were to be committed to the flames.

Martin Luther, whose teachings thus convulsed Germany, was born of sturdy peasant stock in the little village of Eisleben, Saxony. His boyhood was spent in poverty, and he sang in the streets for



MARTIN LUTHER

bread, as was the custom of poor students. Later his hard-working father was able to send him to the University of Erfurt to prepare for the study of law.

As the result of an inner religious conflict, however, Luther entered the Augustinian convent of monks at Erfurt in 1505. After three years of strict monastic discipline and theological studies he became a professor in the new University of Wittenberg. A few years later he was in Rome on business for his monastic order. When Luther returned from Rome, he was still a loyal believer in the church, but already he had begun to form the views which were to separate him from it. These he later summed up in the words, "Justification by faith," or salvation through trust in God's mercy and not through penances and other works of righteousness.

Luther's career as a reformer began overtly when he nailed his famous Ninety-five Theses to the door of the castle church in Wittenberg on Oct. 31, 1517. Such challenges as this document presented were common in university life and are met with even today. Luther's theses were an attack on the prevailing system of indulgences, as preached by Johann Tetzel, an unscrupulous monk. When published in pamphlet form they attracted much attention, and controversy followed. Cardinal Cajetan was sent as the pope's legate to Luther, but could not induce him to retract his utterances. Luther's debate at Leipzig with John Eck (1519) merely widened the breach. In his pamphlets, 'Address to the German Nobility' and 'The Babylonian Captivity of the Church', Luther broke completely with the Roman Catholic church; and then burned the Pope's bull condemning his opinions (1520) and a copy of the canon or church law. To the faithful he was now little better than a rebel.

While returning from the Diet of Worms Luther was seized with the help of his friend the elector of Saxony and safely hidden in the stout old castle of the Wartburg near Eisenach. There he remained in disguise, concealed even from most of his friends,

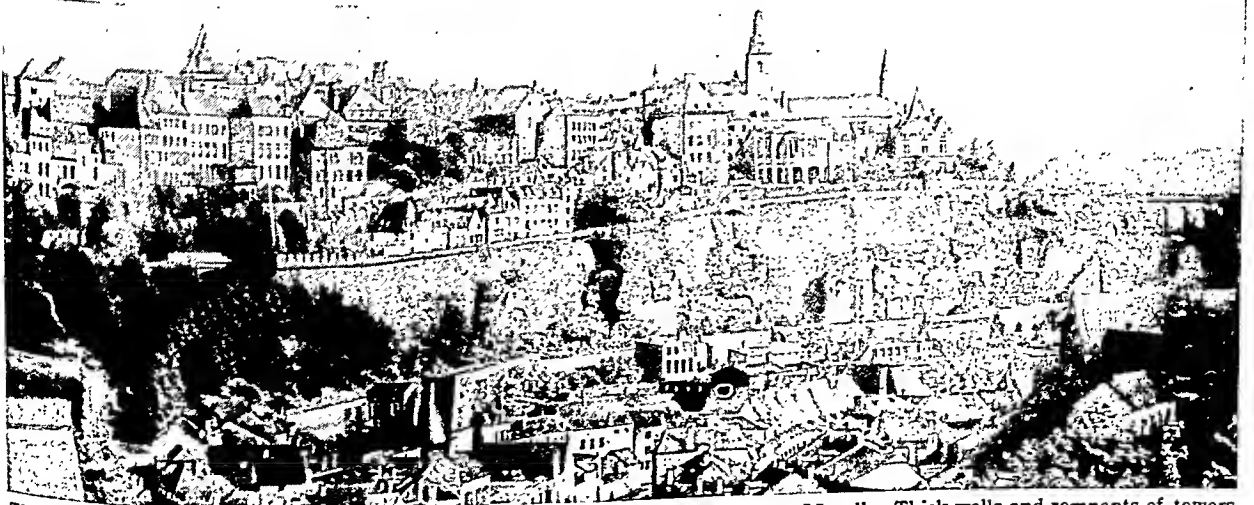
until the emperor's preoccupation with his wars with France over Italy made it comparatively safe for Luther to return to his work at Wittenberg.

In 1525 Luther married a former nun, Katharine von Bora. This emphasized his rejection of monasticism and celibacy for the clergy. The remainder of Luther's life was spent in writing, preaching, and organizing the reformed church in Saxony. He replaced the Latin service of the mass with a service in the German language and wrote many hymns which are still in use, notably the famous *Ein feste Burg ist unser Gott* ('A Mighty Fortress Is Our God'). He prepared catechisms for young and old, and completed his translation of the Bible, which still remains the standard German version. He was active in public affairs and especially worked to advance popular education. Serious ailments shadowed his last years but did not check his activities.

Luther died on Feb. 18, 1546, at Eisleben, the place of his birth, just as the long deferred war to put down his teachings was about to break over Europe (see Thirty Years' War). His body was carried in state to Wittenberg, attended by throngs of mourners, and buried in the castle church to whose door he had nailed the Ninety-five Theses. (See also Reformation.) **LUXEMBURG**; French **LUXEMBOURG**. The grand duchy of Luxembourg is one of the smallest nations, yet it is important in the life of Western Europe. Luxembourg's total area is only 999 square miles, a little less than that of Rhode Island. The population is 290,992 (1947 census), about half that of New Orleans, La. Roughly triangular in shape, the little country stretches about 55 miles north to south and some 35 miles east to west. It is hemmed in by Belgium, France, and Germany.

Tiny Luxembourg is among the ten top iron and steel producers in the world. Its ore comes from the Luxembourg-Lorraine basin. The producing center is Esch-sur-Alzette. In 1953 the capital city, also named Luxembourg, became headquarters for the European

LUXEMBURG, THE CAPITAL CITY OF THE GRAND DUCHY



The picturesque little city of Luxembourg perches on a crag 200 feet above the valleys of the Alzette and Petrusse rivers.

tributaries of the Moselle. Thick walls and remnants of towers recall the feudal days when it was a mighty fortress of Europe.

Coal and Steel Community, a six-nation pool of coal and iron resources. The picturesque city, which has preserved many medieval buildings, is also the seat of the Council of Europe. Other principal cities are Wiltz, Echternach, and Differdange. The leading manufactures include leather, textiles, pottery, beer, rubber tires, chemicals, wine, and fertilizers.

Despite its industrial importance, Luxembourg is chiefly an agricultural country. About 60 per cent of its area is in small farms. A large part of the rugged north, which lies in the Ardennes Mountains, is forested. There the chief industries are lumbering, dairying, and livestock farming. Southern Luxembourg slopes down to the valley of the Moselle River. Many farm homes are thatch-roofed, their beams blackened with age. The chief crops are oats, barley, wheat, potatoes, rye, sugar beets, hops, and piump grapes for sparkling wines.

Luxembourg is becoming a favorite of tourists. The little country has excellent railways and roads. Even the cycle paths and foot trails are well kept. They lead through wooded hills and sunny valleys, along trout streams, and under crags guarded by turreted castles built in the Middle Ages. In villages and towns, friendly cafés are "homes away from home." Everyone who has a plot of ground grows flowers, especially roses. Every village and town, and even different sections of the cities, has its own band, orchestra, and singing group.

Luxemburgers are a sturdy people who cherish their independence and their traditions. Their language is *Letzeburgesch*, a variant of German; but they also speak French, and the high schools also teach English, Spanish, and Italian. Schooling is free and compulsory from the age of 6 to 13. Over nine tenths of the people are Roman Catholic, but there is freedom of religion. The government pays the clergy of all faiths.

Luxembourg is a constitutional monarchy. Its constitution dates from 1868, with revisions in 1919 and 1948. The ruling family is the House of Nassau; the present ruler is the Grand Duchess Charlotte. Men and women over 21 years of age elect the Chamber of Deputies; the sovereign appoints an advisory Council of State of 15 members.

In their stormy history, Luxemburgers have kept their individuality by living up to their national motto—*Mir woelle bleiwe wat mir sin* ("We want to remain as we are"). Luxembourg warred its way to its greatest power from about the middle of the 14th century to about the middle of the 15th, and was a realm about four times its present size. Four of the princes of Luxembourg became Holy Roman Emperors.

Luxembourg was later held by Burgundy, Germany, France, Spain, and Austria. In 1815 the Congress of Vienna made it a grand duchy, under the rule of William I of the Netherlands. Luxembourg futilely revolted in 1830. In 1867 the European powers guaranteed the duchy's independence and neutrality. Germany, however, seized it in World War I and again in World War II.

In 1944 and again in 1945 the Allies drove out the Germans after destructive battles. Luxembourg civilians stoutly resisted the German occupation and, in 1948, changed their constitution to abandon neutrality; in 1949 they joined the North Atlantic Treaty Organization. Meanwhile, in 1948, Luxembourg joined Belgium and the Netherlands in the Benelux customs union. By 1953 the duchy had one of the soundest economic structures in the world.

LYCURGUS. The life of Lycurgus, as told by Plutarch, is one of the most fascinating in the ancient times of Greece. No one, however, knows how much of the account is truth and how much is fancy (see Plutarch). Many scholars believe that Lycurgus was a real person, who lived in the late 9th or early 8th century B.C.

According to Plutarch, Lycurgus had not only the gift of wisdom, but also the superb attribute of unselfishness. At one time a lawless youth struck at him with a staff and put out an eye. Instead of taking revenge on the lad, Lycurgus brought him into his own home to live. There the young man could see how Lycurgus lived and learned the nobility of his attitude toward his fellow men. Appreciatively, the lad turned from his wild ways and became a good citizen of Sparta—the Greek state loved by Lycurgus.

Some scholars believe that Lycurgus was the son of Eunomos, king of Sparta. His brother inherited the throne, then died before his heir was born. Lycurgus became regent, but soon left Sparta to travel abroad.

Years later he returned to find Sparta in a state of disorder. Aided by civic leaders, Lycurgus is said to have made himself master of the city state and drew up a new body of laws. He designed the new code to place the citizens under complete control by the state and to build Sparta into a military power. His laws, in fact, created a new way of life in Greece. From that stern, regimented, courageous life we get the word *Spartan* (see Sparta).

After his fellow citizens pledged that they would obey the laws and not change them until he returned, Lycurgus again went abroad. He heard from the oracle at Delphi that the Spartans would enjoy everlasting prosperity as long as they kept their vow. In an effort to insure their good fortune, he decided never to return to his loved land.

LYNCHING. The word "lynching" has come to mean mob violence that deprives a person of his life without trial in a regular court of law. It differs from gang murder in that the lynching is supposed to be punishment for some crime or offense. The term originated during the American Revolutionary War, when Col. Charles Lynch, a Virginia planter and magistrate, formed an organization to try and punish outlaws and British sympathizers. In the frontier days, "lynch law" was practiced by vigilantes in the Far West, where courts and policemen were unknown. Cattlemen and miners set up their own police and trial procedures to keep order. Those who committed grave offenses were "lynched," usually by hanging.

In the South, during the confusion that followed the Civil War, the Ku Klux Klan was organized. Its purpose was to protect white people by frightening Negroes and those whites who deviated from the community ideals. The Klan members rode about in groups, usually at night, wearing masks, fantastic high pointed cardboard hats, and flowing gowns. The more violent bands flogged or tarred and feathered their victims and sometimes hanged them. From these illegal acts the practice of lynching Negroes grew. Almost always the charge against the Negro was some offense against whites. Frequently the charge was a trivial one. The same attitude toward Negroes that led to lynchings perpetuated other discriminatory measures in the South, such as voting disabilities, residential segregation, and unequal educational facilities (see Negroes).

Over the years a strong sentiment against lynching has developed throughout the country and the number of such crimes steadily decreased. According to figures published by Tuskegee Institute, the high point was reached in 1892, when 161 lynchings of Negroes were reported. In the same year, 69 whites were lynched. The number of Negro lynchings dropped from 18 in 1935 to 8 in 1936; and in the next ten years the average yearly number was less than 5. From 1947 to 1951 the total number was 6. In 1951, 1952, and 1953, no lynchings were reported.

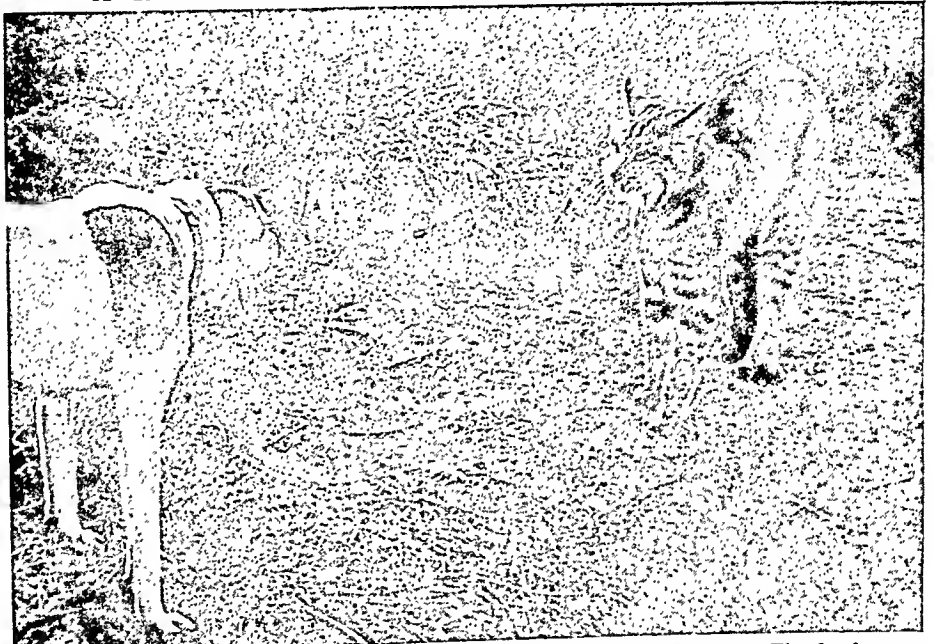
LYNN, MASS. Since early colonial days Lynn has been a shoemaking city. It was founded on Massachusetts Bay, ten miles northeast of Boston, in 1629 under the Indian name Saugus and renamed in 1632 for King's Lynn in England. By 1700 almost every household had a shoe shop, and Lynn made shoes for most of Boston. When shoemaking machinery was introduced in 1848, Lynn became the nation's shoe center. Half a century later the industry spread to other cities and Lynn lost first place; but it still ranks high in the manufacture of women's and children's footwear. It has added many new industries, including electrical equipment, tanned leather, bakery products, and women's clothing.

Lynn has over 1,500 acres of parks and beaches, including Lynn Beach on Nahant Bay, Flax Pond, and Lynn Woods. The Mary Baker Eddy House marks the birthplace of Christian Science (see Eddy). At nearby Saugus one of America's first ironworks was built in 1643. Lynn was incorporated as a city in 1850. It is governed by a mayor and council. Population (1950 census), 99,738.

LYNX. So acute is the sight of the lynx that the ancients believed it could see even through a stone wall. That is why we still speak of sharp-sighted people as "lynx-eyed."

This member of the cat family is found in the northern regions of both the New and the Old World. It is smaller than the leopard and larger than the true wildcat, which exists only in Europe. The name wildcat is, however, applied in America to various species of lynx. All have stumpy tails, long limbs, tufted ears, and eyes which contract in the daytime to a narrow slit. They live in forests and rocky places and are fond of resting stretched out on a tree limb in the sun. By night they hunt their food, which consists of birds and small animals. They often kill sheep and chickens.

A HUNTED LYNX TURNS ON ITS PURSUER



This sharp-eyed lynx, looking like an overgrown cat, faces the huntsman's dog. The dog is wary. Perhaps it knows that no dog is a match for a full-grown lynx if the lynx decides to fight.

The sudden cry of a lynx at night is one of the most frightful sounds known to woodsmen. Usually it consists of a single sharp howl. Then there is silence. The creatures on which the animal preys, such as rabbits or quail, seek to escape the killer's notice by lying perfectly still. The lynx, unable to distinguish their exact positions, crouches down all ready for a leap, then emits its piercing cry. The timid victim, startled by the fearful sound, cannot help jumping convulsively. At that instant, the lynx strikes and kills.

The Canada lynx has heavy gray fur mottled with brown, and great numbers of these pelts are exported from Alaska and Canada. The red, or bay, lynx is common in many parts of the United States. It has yellowish brown fur tinged with red. The bobcat of the southwestern United States looks like the red lynx, though smaller. Scientific name of the Canada lynx, *Lynx canadensis*; of the red lynx, *Lynx rufus*.

LYONS (*lī'onz*), FRANCE. The third largest city of France, Lyons (which the French spell Lyon and pronounce *lē-on'*), is one of the most important silk centers of the world. It is built where two great rivers, the Rhône and the Saône, meet. The heart of the city lies on a point of land between the two rivers, but it extends back along their banks. The rivers are bordered by quays, and fine bridges connect the different parts of the city.

The silk industry was introduced into Lyons in the 15th century. Although many other industries have sprung up since then, the manufacture of silk, both artificial and pure, is still Lyons' major industry. The shimmering silks manufactured here and in the neighboring villages are used all over the world, and the weaving of them keeps thousands of hand and power looms humming. Hand looms are used for the richest and most elaborately wrought stuffs, and many of the skilled weavers belong to families which have for centuries handed the trade down from one generation to the next. Other important manufactures are iron, steel, and copper products, gold and silver products, chemicals, dyes, wine, and cheese.

Each spring a great international fair is held in Lyons. Almost every branch of industry is represented and exhibitors from many different countries attend it. The city has been a trading center since Roman days and during the Middle Ages its fairs were famous.

Lyons has a university with schools of law, science, medicine, and pharmacy; a school of fine arts where the persons who make the designs for the silks are trained; and other schools and colleges. There are also many beautiful new and old buildings—cathedrals, monasteries, a municipal library, art galleries, and hotels. Roman remains are found in certain parts of the city.

Lyons is one of the most strongly fortified cities in France, with a double ring of forts about it. The town was founded by the Romans before the Christian era, and was the starting point of four great highways built

by the Emperor Agrippa. Augustus made it the capital of Celtic Gaul and built aqueducts, temples, and a theater. Later it was ravaged by the barbarians and abandoned by the Empire. Late in the 5th century it was made the capital of the Burgundians, and in 1312 it became a part of France. Two famous church councils were held here. During the Middle Ages several uprisings took place and the town was badly damaged. But Napoleon rebuilt and improved it, and since his day it has been one of the greatest cities of France. Population (1946 census), 439,861.

LYRE-BIRD. The bird whose tail has "made him famous" is the lyre-bird of Australia. Without the 16 long and curiously shaped tail feathers of the male, this bird is not at all unusual, for both male and female are of unattractive form, about the size of a grouse, and of a sooty-brown color with a few markings of red. These tail feathers are about two feet long, generally drooping like a peacock's train, but when raised and spread they take the shape of the Apollo's lyre. The tail does not reach perfection until the birds are three or four years old. It is shed in the fall and renewed each spring. The male bird is very proud of his fine feathers and one of his curious habits is that of scratching together little mounds of soil and leaves upon which he stands, spreading his tail, drooping his wings, and calling to his mate to admire him (for illustration in colors see *Paradise Birds*).

The lyre-bird is the largest of the singing birds. He has a mellow liquid note, and is said to imitate the songs of other birds and even animals. The nest is placed on the ground, at the foot of a tree or rock, and is closely woven of fine strong roots and lined with feathers. About this nest is heaped an oven-shaped mass of sticks, moss, and leaves, with a side entrance so that the inner nest and the one egg are entirely protected. The birds are very shy, and when molested escape by running rapidly in the underbrush. They are found at times in the trees, but they are not good flyers. Scientific name of the best known species, *Menura superba*.

THE EASY REFERENCE FACT-INDEX

GUIDE TO ALL VOLUMES FOR SUBJECTS
BEGINNING WITH

K-L

TO SAVE TIME

USE THIS INDEX 

EDITOR'S NOTE ON NEXT PAGE TELLS WHY

SPECIAL LISTS AND TABLES

KOREAN CONFLICT CHRONOLOGY	376-7
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Numerous other lists and tables in the fields of geography, history, literature, science, mathematics, and other departments of knowledge will be found with their appropriate articles in the main text

EDITOR'S NOTE

EVERY user of Compton's Pictured Encyclopedia should form the habit of *first* turning to the Fact-Index section at the end of each volume when in search of specific information. This index is a miniature work of reference in itself and will often give you directly the facts, dates, or definitions you seek. Even when you want full treatment of a subject, you will usually save time by finding in the index the exact page numbers for the desired material.

All page numbers are preceded by a letter of the alphabet, as A-23. The letter indicates the volume. If two or three page numbers are given for the topic you are seeking, the first indicates the more general and important treatment; the second and third point to additional information on other pages. Where necessary, subheadings follow the entry and tell you by guide words or phrases where the various aspects of the subject are treated.

The arrangement of subheadings is alphabetical, except in major historical entries. In these the chronological order is followed.

The pictures illustrating a specific subject are indicated by the word *picture* or *color picture* followed by a volume indicator and a page number. A picture reference is frequently intended to call attention to details in the text under the illustration as well as to the illustration itself. This picture-text, therefore, should always be carefully read. The pictures are usually on the same page as the text to which you are also referred; sometimes they are found in a different but related article which will add interest and information.

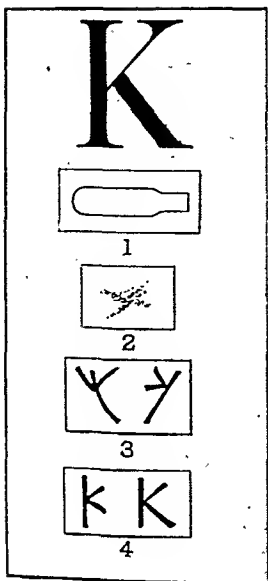
The pronunciations given are those preferred by the best and most recent authorities; alternative pronunciations are indicated where usage is divided.

In recent years hundreds of foreign geographical names have been changed, either officially or by custom. Both old and new names are given at the appropriate places in the alphabet.

Populations are those of the latest census or an official estimate when available if no census has been taken since World War II. Distances between points are map or air distances, not distances by railroad.

THE EASY REFERENCE FACT-INDEX

Reg. U. S. Pat. Off.



OUR LETTER K probably started in Egyptian writing as a picture of the palm of a hand (1). To the Egyptians, this picture stood for the corresponding word; but soon after 2000 B.C., a Semitic people called the Seirites used the picture as an alphabetic sign for the sound of 'k'. Apparently they did this because their name *kaph* for 'the palm' began with this sound.

The surviving Seirite inscriptions have been so badly weathered that the sign is almost illegible, but it suggests a rude cross (2). When the Phoenicians and other Canaanites adopted this alphabet, for a time they used lines to suggest a wrist and fingers; but, as time passed, the sign lost all resemblance to a hand (3). The name remained *kaph* in Hebrew and other Semitic languages. The sign was always shaped to suit writing from right to left in Semitic fashion.

After the Greeks learned to write from the Phoenicians, they simplified the sign and turned it around for writing from left to right (4). They also renamed it *kappa*. The Romans took it without change into Latin, and from Latin it came to us.

Our handwritten 'k' is simply a capital K, with small, easily made diagonal strokes; our printed small 'k' imitates the handwritten one.

NOTE.—For the story of how alphabetic writing began and developed, see the articles Alphabet; Writing.

'K-2', U. S. Navy blimp, picture B-33 K 2, Mount. See in Index Godwin Austen

Kaaba, or Canba (*kā'a-bā* or *kā'bā*), or Kaabeh (*kā'a-bē*), Mohammedan shrine at Mecca M-157, picture M-157

Kab'hala, or Cabala, mystical interpretation of Scriptures H-327

Kabinda, Angola. See in Index Cabinda

Kabuki (*kā'bū'kē*), Japanese dance-drama J-313, D-14f

Kabul (*kā'bū'l* or *ka-bū'l*), Afghanistan, capital, in province of Kabul; key to n. India; pop. 206,208; A-32-3, maps A-33, A-407

Kabye (*ka-bī'l*), one of a North African Berber people A-39

Kachina (*kā-chē'nā*), Indian name for spirit of an ancestor, also a portrayal of the spirit; I-95-6 dolls D-122f, I-95, 96, picture I-95

Kachin (*ka-chin'*) Hills, in Burma B-359, map I-123

Kachins, a marauding people of Indo-Chinese origin living along border of upper Burma B-359

Kadi, or cadi (*kā'dī*), name given by Mohammedans to a magistrate.

Kadlak Island, Alaska. See in Index Kodiak

Kaf'ir corn, or kaffir corn, a variety of sorghum K-1, picture S-236

Kafir, or Kaffirs (*kāf'ērz*), in Afghanistan, an Aryan people A-31

Kafka (*kāf'kū*), Franz (1883-1924), writer, born Prague, Bohemia; his psychological stories penetratingly treat futile struggles of the individual against the sense of guilt and frustration. Translated works include novels 'The Trial', 'The Castle', and 'Amerika', and story 'Metamorphosis'.

Kaganovich (*kā-gū-nōv'yich*), Lazar Moiseevich (born 1893), Russian government official, born in the Ukraine; joined Central Committee of Communist party 1924, Politburo 1926; as secretary of Ukrainian Central Committee 1925-28 built Dnieper Dam; became Communist

party boss of Moscow 1928, reconstructed city and began famous subway; commissar of railroads 1935-37 and 1938-42, a deputy premier 1947-53, a first deputy premier 1953-.

Kaga'wa, Toyohiko (born 1888), Japanese preacher and social reformer; converted to Christianity at 14; author of poetry, essays, religious studies, stories for children, and novels.

Kagera (*kā-gā'rā*) River, Africa, flows into Lake Victoria, map E-199

Kago (*kā'gō*), an open palanquin, used in Japan.

Kagoshima (*kā-gō-shē-mā*), Japan, one of chief cities of Kyushu Island; pop. 229,462; home of crackled Satsuma ware; maps J-297, A-406

Kahn, Otto Hermann (1867-1934), American banker and patron of music and art, born Mannheim, Germany; came to U. S. 1893; member firm Kuhn, Loeb & Co., New York City, after 1897 ('Of Many Things').

Kahoolawe (*kā-hō-lā'wē*), small island of Hawaiian group; 45 sq. mi.; mostly barren; H-288a, maps H-286, P-17

Kahuna (*kā-hū'nā*), leader in old Hawaii H-289

Kalbar (*kā'bār*) National Forest, in Arizona, adjoining Grand Canyon National Park on n.; 1,865,396 acres; forest headquarters Williams, Ariz.

deer and cougars in E-216

Kaletour (*kā-ē-tōr'*) Falls, in British Guiana, picture S-277

Kalfeng (*kā'fūng'*), China, capital of Honan province, 450 mi. s. of Peking; pop. 303,422; remnants of 12th-century colony of Jews; maps C-260, A-406

Kallas (*kā-lās'*), temple at Ellora, Hyderabad H-455

Kailiyard (*kā'yārd*) (meaning kitchen, or cabbage, garden) school, term applied to group of Scottish novelists who wrote of life of common people with copious use of

dialect; best represented by Ian MacLaren and Sir James M. Barrie. Kainite, a mineral salt M-265

Kairouan (*kā-r-wān'*), also Kairwan (*kā-r-wān'*), Tunisia, sacred city of Mohammedans; Ukhah mosque, rebuilt in 827; pop. 32,299; map A-167

Kaisaria, Turkey. See in Index Kayseri

Kaiser (*kā'zēr*), official title of German and Holy Roman emperors origin C-15

Kaiser, Georg (1878-1945), German dramatist and critic; a leader of expressionist school; his plays focus on social problems ('Gas'; 'From Morn to Midnight'; 'The Coral').

Kaiser, Henry J. (born 1882), industrialist, born near Canajoharie, N. Y.; constructed piers for San Francisco-Oakland Bay Bridge; built Hoover, Bonneville, and Grand Coulee dams; built ships, World War II; industries include cement, sand and gravel, aluminum, magnesium, steel, chemicals, automobiles.

Kaiserslautern (*kā'zērz-lou-tēr'n*), Germany, industrial city 35 mi. w. of Mannheim; pop. 62,395; Frederick Barbarossa built castle here about 1152.

Kaiser Wilhelm's Land, New Guinea N-143

Kalaks. See in Index Kazaks

Kajar', dynasty of Persia, founded by Aga Mohammed P-158

Kala azar (*kā-lā ā-zār'*), a fatal malarialike fever common in certain parts of India, transmitted by the bite of a sand fly.

Kalabits, a tribe in Borneo; good farmers and metalworkers.

Kalah, also Nimrud, ancient Assyrian city, near Nineveh, built 1300 B.C. by Shalmaneser I; abandoned, then rebuilt as royal residence city about 880 B.C.; rich in archaeology; N-239 sculpture, map I-224

Kalahari (*kā-lā-hā'rē*) Desert, South Africa, chiefly in Bechuanaland; about 240,000 sq. mi.; S-241, 242, maps S-242, A-47, 41-2, D-73a

Bushman E-456, picture E-454

Livingstone crosses A-49

Kalakana (*kā-lā-kou'ā*) I, David

- (1836-91), king of Hawali 1874-91; because of his extravagant and disorderly rule was forced to grant a new constitution (1887) which restricted royal power.
- Kalamazoo**, Mich., industrial city in s.w. on Kalamazoo River, about 40 mi. e. of Lake Michigan; pop. 57,704; celery and fruits; paper, pharmaceuticals, chemicals, metal products; Western Michigan College of Education, Kalamazoo College, Nazareth College: *maps* M-227, U-253
- Kalamazoo Case**, The, in history of education. Citizens of Kalamazoo, Mich., challenged (1872) collection of taxes for support of a public high school. The Michigan Supreme Court decided (1874) state had right to levy taxes for support of complete system of public education, including high schools and universities. Case set a precedent for other states: E-242-3
- Kalamazoo College**, at Kalamazoo, Mich.; Baptist; chartered 1833 as Michigan and Huron Institute, as college 1855; arts and sciences.
- Kalapooia**. *See in Index* Calapooya
- Kalapooian Family**, a group of Indian tribes, formerly lived in valley of Willamette River, n.w. Oregon, and spoke a distinct stock language.
- Kalat**, or **Khelat** (*kā-lā'ī*), region occupying more than half of Baluchistan; area about 72,500 sq. mi. (including Kharan); Kalat formerly a princely state of India; joined w. Pakistan 1948: *map* I-68a
- Kalaupapa** (*kā-lā'ū-pā'pā*), Hawaiian Islands, leper settlement (established 1860) on Molokai Island: H-288a
- Kalb**, Baron de. *See in Index* De Kalb
- Kale**, vegetable of mustard family C-1
- Kaleidoscope** (*kā-lī'dō-skōp*) K-1
- Kalends**, or **Calends**, in Roman calendar C-22
- 'Kalevala'** (*kā-lā-vā'lā*), ancient Finnish epic F-71, S-410-11
- Kalgan** (*kā'l-gān*), historic trade center of Inner Mongolia and capital of Chahar province, at gate in Great Wall of China, about 100 mi. n.w. of Peiping (Peking): pop. 151,234; transit trade in sugar, tea, cloth, flour: M-342, 344, *maps* M-343, A-406
- Kali**. *See in Index* Devi
- Kalidasa** (*kā-lē-dā'sa*) (3d century?), greatest dramatic and lyric poet of India and one of great world poets ('Sakuntala').
- Kalinin** (*kā-lēn'yīn*), Michael I. (1875-1946), Russian statesman; a peasant himself, represented peasants in Soviet government in which he became president of central executive committee 1919, chairman 1923; chairman of Supreme Soviet of U.S.S.R. 1938-46: *picture* S-361
- Kalinia** (*kā-lē-nēn*), formerly **Tver** (*tā-vēr*), Russia, trade center, on Volga River, 100 mi. n.w. of Moscow; pop. 300,000; capital of independent principality 13th to 15th centuries: *maps* R-266, E-417
- Kalinigrad** (*kā-lē-nīn-grād*), German **Königsberg** (*kū'nīks-bēr'k*), Russia, fortified seaport, former capital of East Prussia, on Pregel River, 4 mi. from mouth; included in Russia since 1945; pop. 150,000; university, castle: *maps* R-266, G-88, P-344
- Kalispell**, Mont., city in n.w. near Glacier National Park; pop. 9737; lumber products: M-378, *maps* M-374, U-252
- Kalium**, Latin name for potassium, *table* C-211
- Kalix River**, Sweden, flows s.e. 208 mi. to Gulf of Bothnia, *map* N-301
- Kallikkak**, fictitious name of a two-branch family dating from Revolutionary War days, investigated by H. H. Goddard in his studies of heredity. Of 480 descendants of a feeble-minded mother and a sound father 282 were mental, moral, or physical defectives; all below normal in intelligence. Of 496 descendants of same father and a mother of good stock only 4 were defective; all were of sound mentality. *See also in Index* Jukes
- Kallima butterfly**. *See in Index* Oriental leaf butterfly
- Kalm**, Peter or Per (1715-79), Swedish botanist, born Finland; visited North America to make survey of natural history 1748-51 ('Travels into North America') quoted A-217
- Kalmar**, formerly **Calmar**, Sweden, port and cathedral town 200 mi. s. of Stockholm; pop. 27,049; historic castle dating from 12th century: *map* E-424
- Kalmar, Union of** (1397) D-71
- Kalmia**, genus of plants of the heath family, best-known species being mountain laurel (*Kalmia latifolia*).
- Kalmucks**, branch of Mongols M-346
- Kalmus**, Herbert Thomas (born 1881), chemical engineer, born Chelsea, Mass.; director Research Laboratory of Electrochemistry and Metallurgy, Canadian government 1913-15; invented Technicolor in motion pictures.
- Kal'somine**, or **calcimine** P-41
- Kalthoeber**, Charles, one of best of colony of German bookbinders who lived in London at end of 18th century; influenced by Roger Payne; style recognizable by ornaments in the panels of the back; most of his bindings bear his label.
- Kamakura** (*kā-mā'kū-rā*), Japan, seacoast city on Honshu s. of Yokohama; pop. 85,891; long center of feudal government
- Great Buddha** J-314, *picture* J-317
- Kama** (*kā'mā*) River, in e. European Russia, largest tributary of Volga River; over 1000 mi. long; timber trade: *maps* R-266, E-417
- Kamchatka** (*kām-chāt'ka*, Russian *kām-chāt'ka*), peninsula of e. Siberia; about 70,000 sq. mi.; pop. 135,000: K-1, *maps* A-406, 411
- Kamehameha** (*kā-mā'hā-mā'hā*) I (1753-1819), Hawaiian king; promoted European commerce H-291
- birthday celebrated F-57
- volcano destroys opposing army H-288
- Kamel**, or **Camel**, George Joseph (1661-1706), Moravian botanist, Jesuit missionary to Philippines; *camellia* named for C-53
- Kamerun**, region in w.-central Africa. *See in Index* Cameroons
- Kamik** (*kā'mīk*), sealskin boot worn by Eskimos, *picture* S-162
- Kamikaze** (*kā-mī-kā-zē*), Japanese for 'divine wind'
- Mongol fleets destroyed by J-319
- Kamimura** (*kā-mē'mū-rā*), Hikonofu, Baron (1850-1916), Japanese admiral; notable victory over Russian cruiser squadron off coast of Korea in Russo-Japanese War.
- Kamloops**, British Columbia, Canada, a railroad city on Thompson River about 160 mi. n.e. of Vancouver; pop. 8099; mining, fruit growing, ranching, hunting: *maps* C-68, 80
- Kampala** (*kām-pā'lā*), the commercial center of Uganda, East Africa; capital of province and kingdom of Buganda; airport; pop. 22,094:
- E-199, K-35, *maps* A-46, E-199
- Kampen** (*kām'pīn*), Netherlands, town near mouth of river IJssel; pop. 22,088; formerly a Hanseatic town; 14th-century town hall and church.
- Kanagawa**, Treaty of, name of Perry's treaty with Japan (1854). *See in Index* Perry, Matthew Calbraith
- Kanakas**, Polynesians P-4-9, *pictures* P-3, 12
- Kanawha** (*kā-nō'wā*) River, in West Virginia; formed in w.-central part of state by junction of New and Gauley rivers; flows n.w. and joins Ohio River at Point Pleasant; length about 100 mi.; Little Kanawha rises in central West Virginia and flows w. and n.w. about 100 mi. into Ohio River at Parkersburg: *maps* W-100, 106
- Kanazawa** (*kā-nā-zā-iō*), Japan, city on w. coast of Honshu Island; pop. 252,017; bronze and lacquer work, silk; fine public gardens: *maps* J-297, A-406
- porcelain, *picture* J-319
- Kanchenjunga** (*kān-chēn-gūng'gū*), or **Kinchinjunga** (*kīn-chīn-gūng'gū*), 3d highest mountain in world (28,146 ft.); one of the e. Himalayas; on boundary between Nepal and Sikkim; first successfully climbed 1955: *picture* I-53
- Kandahar** (*kān-dā-hār*), also **Qandahar**, trade center in province of Kandahar, Afghanistan, 300 mi. s.w. of Kabul; pop. 77,186; captured by Genhish Khan, Timur Leng, and others; prominent in wars between British and Afghans: *maps* A-33, A-406
- relief by Roberts R-163
- Kandin'sky**, Wassily (1866-1944), Russian painter, identified with German modern movement; one of leaders among nonobjective painters; splendid colorist; author of 'Upon the Spiritual in Art'.
- Kändler** (*kēnt'lēr*), Johann Joachim (1706-75), German potter, born Saxony P-397
- Kandy** (*kān'dī*), Ceylon, highland town in center of island on artificial lake; pop. 57,013; capital of former kingdom of Kandy; Buddhist and Brahman temples: *map* A-407
- Kane** (*kā'nā*), Hawaiian god H-289
- Kane** (*kān*), Elisha Kent (1820-57), Arctic explorer and scientist, born Philadelphia, Pa.; accompanied Grinnell expeditions (commanded 2d) searching for Sir John Franklin; attained Kane Basin (1853) and the then farthest north.
- Kane**, Harnett Thomas (born 1910), author, born New Orleans, La.; known for books on Louisiana ('Bride of Fortune', historical novel about Mrs. Jefferson Davis; 'Queen New Orleans', informal history of author's birthplace).
- K'ang** (*kāng*), a Chinese bed C-263
- Kangaroo** K-1-2, *pictures* K-1-2
- altitude range, *picture* Z-362
- foot K-2, *picture* F-225
- fossil remains K-2
- skeleton, *picture* S-191
- Kangaroo rat**, an American rodent with kangaroo-like hind legs R-77, *picture* A-250b
- K'ang Hsi** (*kāng shē*), or **K'aag Hsi** (1655-1722), Chinese emperor (1662-1722); encouraged arts and literature; consolidated empire
- pottery of period P-396a, color *picture* P-396
- K'ang te**. *See in Index* Pu-yi
- Kankakee**, Ill., city 50 mi. s. of Chicago; pop. 25,856; agricultural implements, pianos, stoves, boilers; institution for insane; Olivet Nazarene College, a Roman Catholic

- divinity school, in suburb: *maps* I-36, U-253
- Kankakee River, rises in n.w. Indiana and flows s.w. into Illinois; headstream of Illinois River: *maps* I-36, I-78
- Kannapolis, N.C., in Cabarrus County, 23 mi. n.e. of Charlotte; pop. 28,448; textiles: *map* N-274
- Kampur, India. *See in Index* Cawn-pore
- Kansa, or Kaw, a Siouan Indian tribe formerly living along Kansas River, now in Oklahoma.
- Kansan Ice Sheet I-5
- Kansas, a central state of U. S.; 82,276 sq. mi.; pop. 1,905,299; cap. Topeka: K-3-16, *maps* K-10-11, 4, 7, U-252-3, 286, *pictures* K-3-4, 13-16 agriculture K-3-4, 13, 6: wheat K-4, *pictures* K-3, 14
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- tree, state K-5
- Kansas, University of, at Lawrence, Kan.; state control; founded 1866; arts and sciences, business, education, engineering, journalism, law, medicine, pharmacy; graduate school: *picture* K-15
- Kansas City, Kan., city on Kansas River; pop. 129,553: K-16, *maps* K-11, U-253, *pictures* K-14, 16
- Kansas City, Mo., city at confluence of Kansas and Missouri rivers; pop. 456,622: K-16-17, *maps* U-253, inset M-319, *pictures* M-324, K-16
- Federal Reserve Bank (10th) and district, *map* F-49
- presidential conventions. *See in Index* Convention, table
- Union Station, *picture* M-324
- water supply, *picture* W-71
- William Rockhill Nelson Gallery of Art K-17, *picture* U-331. *See also in Index* Museums, table
- Kansas City, University of, at Kansas City, Mo.; founded 1929; opened 1933; arts and sciences, dentistry, education, fine arts, law, music, pharmacy; graduate studies.
- Kansas gayfeather. *See in Index* Gayfeather
- Kansas-Nebraska Act (1854) K-17
- Douglas and D-125
- Lincoln opposes L-248
- Sumner opposes S-450
- Kansas River, Kan., formed by junction of Smoky Hill and Republican rivers, Geary County, Kan.; flows 169 mi. across state to Missouri River: *maps* K-4, 11, U-286
- flood of 1951 T-200b
- Kansas State College of Agriculture and Applied Science, at Manhattan, Kan.; state control; founded 1863; arts and sciences, agriculture, education, engineering, home economics, veterinary medicine; graduate school: *picture* K-15
- Kansas State Teachers College, at Emporia, Kan.; state control; founded 1863; liberal arts, business, education, library science; music; graduate schools in science, music.
- Kansas State Teachers College, at Pittsburg, Kansas; state control; founded 1903; arts and sciences, education; graduate study.
- Kan'su, northwesternmost province of China proper; 145,968 sq. mi.; pop. 6,897,781; cap. Lanchow; dyes, gold, mercury, silks, musk, tobacco: *map* C-260
- earthquake E-196
- Kant (*kánt*), Immanuel (1724-1804), German philosopher; founder of "transcendental" or "critical" philosophy; professor at University of Königsberg ('Critique of Pure Reason')
- literary influence G-84
- political theories P-360
- Kantara, Egypt. *See in Index* Qantara, El
- Kantor, MacKinlay (born 1904), novelist, short-story writer, and poet, born Webster City, Iowa ('Turkey in the Straw', 'Glory for Me', poetry; 'Long Remember', 'God and My Country', novels; 'The Voice of Bugle Ann', 'The Daughter of Bugle Ann', dog stories).
- Kaoliang (*kä-6-lä-äng'*), grain sorghum M-73-4, *picture* M-74
- Kaolin (*kä-6-lin*), also China clay, or China stone, clay used in china and porcelain C-341
- chemical composition M-266
- pottery C-341, P-394
- Kapa cloth. *See in Index* Tapa cloth
- Kapell (*kä-pél*), William (1922-53), concert pianist, born New York City; many scholarships; master interpreter of modern works.
- Kapıdagı, peninsula on n.w. coast of Asia Minor (Turkey). *See in Index* Cyzicus
- Kapltza, Peter (born 1894), scientist and inventor, born Kronstadt, Russia; head of Institute for Physical Problems, Moscow, 1935-47; noted for work with intense magnetic fields and low temperatures, also for atomic researches.
- Kapok (*kä-pök*), K-17-18, *pictures* K-18, E-206, table F-63
- Guatemala produces G-222b
- Kapp (*käp*), Wolfgang von (1858-1922), German monarchist, leader of revolt, March 1920, in which Berlin republican government was seized, but which failed because of a general strike; fled to Sweden; arrested for treason on return to Germany 1922; died before trial.
- Kappel, or Cappel, Switzerland, village in canton of Zurich
- Zwingli slain in battle Z-366
- Kapleyn (*käp-tin'*), Jacobus (1851-1922), Dutch astronomer; directed work of computing positions of stars on Sir David Gill's photographic plates of s. heavens; pioneered in modern study of Milky Way.
- Kapu (*kä-pu*), religious restriction in old Hawaii H-289
- Karachi (*kä-rä'chi*), capital of Pakistan; on Arabian Sea, n. of Indus delta; pop. 1,009,438; important airport, seaport, railroad terminus. Center of federal capital area (812 sq. mi.; pop. 1,126,417). Under Indian Empire, the city Karachi was capital of Sind province: *maps* I-54, A-407, *picture* P-42a
- Karafuto, Russia. *See in Index* Sakhalin
- Karaganda, Russia, administrative region in central Kazak S.S.R.; coal basin: R-277
- Karageorge ("Black George") (1766?-1817), nickname given by Turks to George Petrovitch, or George Czerny, Serbian peasant, leader of first Serbian war of independence (1804-8) and founder of Karageorgevitch dynasty: S-103
- Karajich (*kä-rä'gich*), Vuk Stefanovich (1787-1864), Serbian writer, called father of modern Serbian literature; bent efforts toward adoption of Serbian mother tongue as literary language; published Serbian folk songs, wrote Serbian grammar and dictionary.
- Kara Kirghiz, or Black Kirghiz, so called from color of their tents; Mongolian people inhabiting highlands of central Asia.
- Karakoram Range, or Karakorum Range (*kär-a-kö'räm*), mountain range in great plateau of central Asia between Kashmir and Sinkiang; continuation of the Hindu Kush; separated from Himalayas by Indus River; highest peak, Mt. Godwin-Austen (28,250 ft.): K-18
- Karakorum, ruined city in Outer Mongolia (Mongolian People's Republic); capital of Mongol Empire; established by Genghis Khan in early 13th century; visited by Marco Polo; destroyed late in 13th century by Kublai Khan who had moved the Mongol capital to Peking: G-37, *map* A-406
- Karakorum, Mount, in Karakoram Range. *See in Index* Godwin-Austen, Mount
- Karakul, also caracul (*kär-a-kül*), a breed of sheep S-138
- Kara-Kum, a desert in Russia, e. of Caspian Sea R-261, *maps* A-412, D-73a
- Karamzin (*kä-räm-zén'*), Nikolai Mikhailovich (1765-1826), Russian historian, novelist, and critic; most famous work is his popular 'History of Russia'; also wrote 'Poor Liza' and 'Martha the Viceregent', novels; 'Letters of a Russian Traveler'; and compiled 'The Pantheon of Foreign Literature' and 'The Pantheon of Russian Literature'.
- Karankawa (*kä-rän-kä-wä*), Indian tribe that formerly lived in Texas, *map* I-106f, table I-107
- Kara (*kä-rä*) Sea, also Karskoe, arm of Arctic Ocean between Novaya Zemlya and n.w. coast of Siberia, *maps* R-259, 266, A-406
- Kara Strait, at w. entrance to Kara Sea: *map* R-266
- Karat, a measure of weight. *See in Index* Carat
- Karbala, or Kerbela, Iraq, town 60 mi. s.w. of Baghdad; pop. 122,719;

sacred city and place of pilgrimage of Shiite Moslems: tomb of martyr Husein: *maps A-406, I-224*

Karelian Isthmus, land between Lake Ladoga and the Gulf of Finland; included in the Karelo-Finnish Soviet Socialist Republic, U.S.S.R.

Karelo-Finnish Soviet Socialist Republic, 12th constituent republic of the U.S.S.R., created in 1940 by combining Karelian Autonomous Soviet Socialist Republic with territory won from Finland; about 72,000 sq. mi.; pop. 600,000: *maps R-260, 266*

Karens (*ká-rânz'*), a people of Burma B-359

Karikal (*ká-rē-kāl'*), French Settlements in India, settlement in s.e. on Coromandel coast of India; 52 sq. mi.; pop. 70,541; chief town Karikal (pop. 19,000): *maps I-54, A-407*

Karlēldt (*kárl'jēlt'*), Erik Axel (1864-1931), Swedish poet; wrote of life of peasants in Dalecarlia, his native region; awarded Nobel prize, 1931, posthumously

Karl-Marx-Stadt, Germany. *See in Index Chemnitz*

Karl Marx University, Leipzig, Germany. *See in Index Leipzig, University of*

Karloff, Boris, real name William Henry Pratt (born 1887), stage, motion-picture, and television actor, born London, England; to U. S. 1909; in 'Frankenstein' (released 1931), began career as "menace" in motion pictures of horror make-up for "monster" role, *picture M-414*

Karlovy Vary (*kárl'vō-vě vā'vā*), also **Karlsbad**, or **Carlsbad**, Czechoslovakia, watering place in Bohemia; pop. 26,922; ceded to Germany 1938, restored to Czechoslovakia 1945; Karlsbad decrees issued here at conference of German states (1819) enforced censorship to suppress liberal agitation: *map E-425*

Glauber's salt in waters S-31

Karlowlitz, or **Carlowitz** (*kárl'vō-vits*), Yugoslavia, modern Sremski Karlovi (*srēm'skī kárl'vōv-tsi*), town on Danube River, 40 mi. n.w. of Belgrade; peace between Turkey, Austria, Poland, Venice, and Russia signed here (1699).

Karlsbad, Czechoslovakia. *See in Index Karlovy Vary*

Karlsefni, Thorfinn (*thōr'fin kárl-sēf-nē*), Norse navigator of the 11th century E-391

Vinland colony, *picture N-296*

Karlskrona, or **Carlskrona** (*kárls-krō-nā*), Sweden, port on Baltic Sea, 238 mi. s.w. of Stockholm: pop. 30,997; Swedish naval headquarters, arsenals, shipyards, exports fish, stone, iron, lumber: *map E-424*

Karlsruhe, or **Carlsruhe**, (*kárls'rg-ē*), Germany, city, 39 mi. n.w. of Stuttgart; pop. 198,840; mineral springs: *maps G-88, E-416, 425*

Kar'ma, in Hinduism H-357

Karnak (*ká-rnák'*), village on Nile River in Upper Egypt on n. part of site of ancient Thebes: *map E-271*

Temple of Amun E-279, *color picture A-307*

Karnak, Ruins of, in Mammoth Cave, Kentucky, *picture C-157*

Kärnten, Austria. *See in Index Carinthia*

Karok, an Indian tribe that lived on Klamath River, n.w. California. vocational education, *picture I-111*

Károlyi (*ká-rō-yē*), Mihály, Count (1875-1955), Hungarian statesman, born Budapest; although from wealthy family was early influenced by Marxian socialism; president of Hungarian People's Republic 1918-19; resigned upon Bolshevik seizure

of government and thereafter lived in exile ('The Struggle for Peace').

Karoo, or **knroo**, barren tableland in South Africa S-241, 242, *map A-42*

Great Karroo, *map S-242*

Kars, town in n.e. Turkey 110 mi. n.e. of Erzurum; pop. 20,524; Mohammedan holy city, with 11th-century Cathedral of the 12 Apostles; capital of a medieval Armenian principality; several times besieged in wars between Russia and Turks.

Karsavina (*kúr-sá'vī-nū*), Tamara (born 1885), Russian dancer; ballerina of the Maryinsky Theater, the Russian Imperial theater, at St. Petersburg (now Leningrad), and of Diaghilev's ballet company.

Karshi, Russia. *See in Index Bek-Budi*

Karskoe Sea. *See in Index Kara Sea*

Karrun (*ká-rōn'*) River, only navigable river in Iran: rises in western mountains and flows into the Shatt-el-Arab; 400-500 mi. long: *map I-224*

Kasai (*ká-sī'*) River, rises in n.e. Angola and flows n.w. 1000 mi. to Congo River, *maps A-47, B-109*

diamond mines near C-434d

Kasbek, Mount, in Caucasus Mts. *See in Index Kazbek*, Mount

Kaschan, Czechoslovakia. *See in Index Kosice*

Kashia, a Russian cereal R-264

Kashgar, Sinkiang, China. *See in Index Shufu*

Kashmir (*kásh-mēr'*), also called **Jammir** and **Knshmir** (sometimes **Kashmir** and **Jammu**), mountainous state n. of peninsula of India; 84,516 sq. mi.; pop. 4,410,000: K-18, *maps I-68a*

Jhelum River, *picture R-156*

Kashmir, Vnle of K-18, *picture R-156*

Kaskaskia, tribe of Indians of Algonquian family, one of leading tribes of Illinois confederacy (*See also in Index Illinois, a confederacy*); remnants of tribe removed to Indian Territory in 1867.

Kaskaskia, Ill., early French settlement in s.w. on Mississippi River (1700); pop. 112: *map I-37*

capital of Illinois Territory (1809-20) I-41

George Rogers Clark captures C-339, *picture U-373*

Kaskaskia River, in s. Illinois; about 300 mi. long; enters the Mississippi in Randolph County: *maps I-27, 36-7*

Kasner, Edwin (born 1878), mathematician and educator, born New York City; taught at Columbia University after 1900; invented term "googol" (meaning the figure 1 followed by 100 ciphers); author of many works on mathematics.

Kasperle, or **Hanswurst**, German puppet P-440

Kassa, Czechoslovakia. *See in Index Kosice*

Kassel, Germany. *See in Index Cassel*

Kassites (*ká-sits'*), Elamite tribe: overrun Babylonia and founded dynasty (about 1600-1200 B.C.): B-8 land where they lived, *map B-6*

Kat (*kát*), also **Khat**, or **catfa** (*Catha edulis*), evergreen shrub with clusters of small white flowers, native to Arabia and Egypt; leaves used to make stimulating beverage and are also chewed by natives.

Katabolism. *See in Index Catabolism*

Katadhlín (*ká-tū'dlín*), Mount (Indian "big mountain"), bare granite peak in e. Piscataquis County, n.-central Maine, highest point in state (5268 ft.); situated in Baxter State Park: *maps M-46, 52, U-259*

painting by Marsden Hartley P-23a, *color picture P-23a*

Katanga (*ká-tān'gā*), province in southernmost part of Belgian Congo; area 191,827 sq. mi.; pop. about 1,260,000: C-434d

copper mining C-474

Katayev (*ká-tā'yēf*), Valentin (born 1897), Russian novelist, short-story writer, and playwright, born Odessa, Russia; awarded Stalin prize (novels: 'The Embezzlers', 'Time, Forward!', 'Peace Is Where the Tempests Blow'; comedies: 'Squaring the Circle' and 'Blue Kerchief'): R-295

Knt'er, Henry (1777-1835), English physicist, born Bristol; in English army 1794-1814, after which devoted entire time to science; invented floating collimator; determined length of seconds pendulum; constructed standards of weights and measures for Russia.

Katherine, or **Catherine**, of Valois (*vál-vó'*) (1401-37), daughter of Charles VI of France and queen of Henry V of England H-446

Katherine, or **Katharina**, daughter of Baptista of Padua in Shakespeare's 'Taming of the Shrew'; because of her fiery temper was nicknamed "the shrew."

Katmai (*kát'mī*), Mount, volcano of Aleutian Range, in Katmai National Monument, near head of Alaska Peninsula, s. Alaska; height 7000 ft.: A-132

Katmai National Monument, in Alaska N-36, A-132, *maps A-135, N-18*

Katmandu (*kát-mán-dg'*), capital of Nepal, at junction of Bagmati and Vishnumati rivers, about 150 mi. n. of Patna, India; pop. 108,805: *maps A-407, I-54*

Kato (*kát'ō*), Takankiri, Viscount (1859-1926), Japanese statesman, ambassador to Great Britain 1894-99, 1908-13; four times foreign minister; leader of the Constitutionalist party.

Kato, Tomosaburo, Baron (1859-1923), Japanese admiral and statesman; commanded fleet which attacked Germans at Tsingtao in 1914; delegate to Washington Conference 1921; premier 1922.

Katowice (*kát-ō-vēt'sū*), German **Kattowitz**, city of Poland, 165 mi. s.w. of Warsaw; pop. 170,036; iron-works, foundries; in zinc and anthracite area: *maps E-416, 424-5*

Katrine, Loch, lake near Glasgow, Scotland; 5 sq. mi.; immortalized by Sir Walter Scott in 'Lady of the Lake'.

Katsura (*kát'su-rū*), Taro, Prince (1847-1913), Japanese statesman, governor of Formosa, minister of war, then premier 1901-6; again premier 1908-11 and 1912-13; accomplished commercial and financial reforms, annexation of Korea.

Kat'tegat, strait between Denmark and Sweden; 150 mi. long, greatest width 90 mi.: *maps D-71, E-416, 424*

Kntowlitz, Poland. *See in Index Katowice*

Kat'yldá, green insect of the grasshopper family K-18-19

"ear," *picture I-155*

Katzbach (*káts'bák*) River, or **Kocna** (*kō-tsū'bū*) River, tributary of Oder in Lower Silesia, since 1945 in s.w. Poland; on its banks Prussians under Blücher defeated French under Marshal MacDonald (1813).

Kauai (*kā-ō-ā'ē*), one of Hawaiian Islands; 551 sq. mi.; pop. 29,683: H-288a, *maps H-286, P-17*

Key: cápe, át, fār, fást, what, fáll; mé, yét, fērn, thére; íce, bít; rōw, wón, fōr, nót, dg; cáre, bút, ryde, fáll, bárn; out;

- barking sands S-38
 Capt. James Cook H-290
Kauffman (*kôf'mân*), Reginald Wright (born 1877), writer, born Columbia, Pa.; World War I correspondent and contributor of verse, fiction, and essays to periodicals; author of historical and sociological novels ('Spanish Dollars'; 'Overland Trail'; 'House of Bondage').
- Kauffmann** (*kouf'mân*), Angelica (1741-1807), Swiss portrait painter, whose beauty and charming personality enhanced the reputation of her graceful but poorly drawn pictures; friend of Goethe, Reynolds, and other famous men.
- Kaufman** (*kôf'mân*), George S(imon) (born 1889), playwright, born Pittsburgh, Pa.; began as newspaperman, traveling salesman. With Marc Connelly wrote 'Dulcy', 'Merton of the Movies', 'Beggars on Horseback'; with Edna Ferber 'Royal Family', 'Dinner at Eight'; with Morris Ryskind 'Of Thee I Sing' (Pulitzer prize 1932); with Moss Hart 'You Can't Take It with You' (Pulitzer prize 1937); 'The Man Who Came to Dinner'.
- Kaulbach** (*kou'bük*), Wilhelm von (1805-74), German fresco and historical painter and book illustrator, first and most celebrated of a family of painters; illustrated 'Reynard the Fox'.
- Kaunas** (*kou'näs*), also Kovno (*kôv'-nô*), trade center in central Lithuania on Niemen River; pop. 105,370; temporary capital during Wilno dispute; university opened in 1922; manufactures wire, nails: map R-266-7
- Kaunitz** (*kou'nüts*), Prince Wenzel Anton von (1711-94), Austrian statesman, minister of Maria Theresa S-107
- Kauri** (*kou'ri*) gum, the resin, usually fossilized, of kauri pine, native of New Zealand G-232
- Kava** (*kä'va*), or ava, name of a shrub and of an intoxicating drink prepared from its root; plant belongs to pepper family; native to Pacific Islands.
- Kavele**, Tanganyika Territory, Africa. See in Index Ujiji
- Kavkaz Mountains**. See in Index Caucasus Mountains
- Kaw**, or Kansa, a Siouan Indian tribe formerly living along Kansas River, now in Oklahoma.
- Kay**, John (1704-64), English inventor; invented flying shuttle 1733; device considered a menace to labor; was mobbed by weavers and model destroyed; resumed work in France where he died in poverty: I-131, I-202
- Kay**, Sir, one of knights of Round Table R-236
- Kayak** (*kä'äk*), Eskimo canoe C-114, pictures B-218, E-396, G-214
- Kayans** (*kä'anz*), a tribe in Borneo, distinguished by industry, warlike qualities, and skill at hand crafts.
- Kaye**, Danny, real name David Daniel Kominski (born 1913), comedian and actor of stage, screen, and radio, born Brooklyn, N. Y.; known for rapid patter songs and mimicry; much of his material written by wife, Sylvia Fine; starred in motion pictures: 'Up in Arms', 'The Secret Life of Walter Mitty', and 'Hans Christian Andersen'.
- Lady in the Dark**, picture T-113
- Kaye-Smith** (*kä'smith*), Sheila (Mrs. Theodore Penrose Fry) (born 1887), English writer, born St. Leonards-on-Sea; writes chiefly of country life in Sussex ('Sussex Gorse'; 'Tamarisk Town'; 'Joanna Godden'; 'The Village Doctor'; 'Susan Spray').
- Kayseri** (*kä-së-rë*), or Kaisarla (*kä-sä-rë'a*), ancient Caesarea Mazaea (*së-zä-rë'a mäs'a-kä*), Turkey, trade center in Asia Minor, 160 mi. s.e. of Ankara; pop. 65,489; exports carpets, hides, fruit: maps T-215, A-406
 cotton mill, picture T-218
- Kazaks**, or Kaizaks (*kä-zäks'*), Turkic people living in n.e. part of Aral-Caspian basin and closely connected with the Kirghiz.
- Kazak Soviet Socialist Republic**, constituent republic of Russia, e. and n. of Caspian Sea and w. of Mongolia; area about 1,059,458 sq. mi.; pop. 6,000,000; cap. Alma Ata: T-214, map R-260
 coal R-277
 livestock R-276
 people R-262, T-214
- Kazan** (*kä-zän*), Russia, industrial and cultural center, capital of Tatar Republic, 450 mi. e. of Moscow; pop. 500,000; capital of ancient Tatar kingdom, taken by Russians 1552: maps R-266-7, E-417
- Kazan defile**, on Danube River D-16, picture B-24
- Kazbek** (*käz-byëk'*), Mount, one of the highest peaks of the Caucasus Mountains (16,558 ft.); s.e. of Mount Elbrus: map R-267
- Kazvin** (*käz-vën*), town in Iran, 100 mi. n.w. of Tehran; pop. 77,269; trade in rice, fish, raisins, silk; remains of old buildings shattered by earthquakes: maps A-406, I-224
- Ke'a**, a sheep-killing parrot P-93
- Kean** (*kën*), Charles John (1811-68), English actor, not so great as his father, Edmund Kean, but noted as actor in 'Hamlet' and other Shakespearean plays, and as theatrical manager.
- Kean, Edmund** (1787-1833), English Shakespearean tragedian, father of Charles J. Kean. Coleridge said, "Seeing him act was like reading Shakespeare by flashes of lightning" ('Shylock'; 'Othello'; 'Richard III').
- Keane**, John Joseph (1839-1918), American Roman Catholic archbishop and educator, born Ireland; founded churches and schools for Negroes in South; rector Catholic University of America 1886-97; established Confraternity of Holy Ghost; archbishop Dubuque, Iowa, 1900-1911.
- Kearney** (*kär'ni*), Denis (1847-1907), American labor organizer, born County Cork, Ireland; in 1868 emigrated to San Francisco, Calif.; helped to organize the Workingmen's party of California in 1877.
- Kearney, Neb.**, town on Platte River, 125 mi. w. of Lincoln; pop. 12,115; seat of Buffalo County; state hospital; Nebraska State Teachers College. Town named for Fort Kearney (sometimes spelled Fort Kearny), built nearby in 1848 to protect emigrants on Oregon Trail but abandoned in 1871: maps N-103, U-252
- Kearny**, Philip (1814-62), American brigadier general and cavalry leader; captain in Mexican War; served twice in French cavalry to study methods; commanded brigade, then division, in Civil War; killed at Chantilly; nephew of Gen. S. W. Kearny. See also in Index Statuary Hall (New Jersey), table
- Kearny**, Stephen Watts (1794-1848), major general, born Newark, N. J.; served in War of 1812; in war with Mexico occupied New Mexico; civil governor of California March-June 1847, of Vera Cruz and Mexico City brief periods in 1848: F-41, C-47, L-317
- John Charles Frémont and F-284
 Kit Carson and F-41, C-128b
- Kearny**, N.J., suburb of Newark and New York City on Passaic River; pop. 39,952; linoleum, cotton and linen thread, celluloid; shipbuilding; named for Gen. Philip Kearny: map, inset N-164
- 'Kearny'**, U. S. Navy destroyer, completed 1940; 1630 tons; damaged by German submarine on night of Oct. 16-17 when torpedoed while on convoy duty about 350 mi. s.w. of Iceland; 11 men killed; first engagement of World War II to result in death of U. S. Navy personnel.
- 'Kearsarge'**, U.S. cruiser A-129
- Kents** (*këts*), John (1795-1821), English poet K-19, E-380
 memorial in Rome R-195
 quoted E-380, K-19, N-237, B-20
 Shelley's elegy, 'Adonais' S-142
- Keb**, Egyptian god. See in Index Seb
- Keble** (*kë'b'l*), John (1792-1866), English poet and clergyman; professor of poetry at Oxford University for 10 years; Keble College built as a memorial ('The Christian Year').
- Keble College**, Oxford University, England O-434
- Kebnakaise** (*këb'nü-kä-sü*), highest peak in Sweden, in Kjölen Mountains (7005 ft.), map N-301
- Keeskemet** (*këch'këm-ët*), Hungarian "farmer-town" on plains 50 mi. s.e. of Budapest; pop. 88,374; tanning, milling; center of fruit, cattle, rye area: maps B-23, E-416-17
- Kedah** (*kä'dü*), a Malay state; 3660 sq. mi.; pop. 554,441. See also in Index Malay States, Unfederated
- Keddah** (*këd'a*), corral for trapping elephants in s.e. Asia E-327, picture E-326
- Kedron** (*kë'drôn*), Valley of, also Cedron, or Kidron, deep depression e. of Jerusalem where brook flowed in ancient times; mentioned in Bible: J-335
- Keel**, of a ship S-157-8. See also in Index Nautical terms, table
- Keel**, false, an extra keel, often weighted, below the true keel of a ship, to help stabilize vessel.
- Keeley**, Leslie E. (1832-1900); physician, originator of cure for alcohol and drug addicts; graduated from Rush Medical College, Chicago, Ill.; entered Federal army as surgeon; practiced in Dwight, Ill.; opened sanitarium there for his cure, later establishing branches in many cities.
- Keeling Islands**, in Pacific Ocean. See in Index Cocos Islands
- Keel Mountains**. See in Index Kjölen Mountains
- Keelson**. See in Index Nautical terms, table
- Keelung** (*kë'lung'*), Formosa, seaport in n.; pop. 145,240: F-242a
- Keen**, William Williams (1837-1932), surgeon, born Philadelphia, Pa.; professor surgery Jefferson Medical College 1889-1907; pioneer work in delicate operations of brain and nervous system; wrote and edited many books on surgery and anatomy.
- Keene**, Charles Samnel (1823-91), English pen-and-ink artist, for 40 years a contributor to *Punch*; foremost among English craftsmen in black and white, but work has never been popular because of its unconventionality.
- Keene**, Laura (1826?-73), Anglo-American actress and manager; her company was playing 'Our Ameri-

- can Cousin' at Ford's Theater, Washington, D. C., when President Lincoln was assassinated.
- Keene, N. H., city on Ashuelot River, 42 mi. s.w. of Concord; pop. 15,638; machinery, woollens, shoes, furniture, screws and bearings; Keene Teachers College; *map* N-151
- Keep, of castle, inmost and strongest part C-134, *pictures* C-133, E-351
- Keep America Green, an educational movement in U. S. to prevent the starting of forest fires F-238
- Keeshond (*kās'hōnd*), dog D-116c, color *picture* D-115, *table* D-119
- Keewatin (*kē-wā't'n*), District of, in e. Canada, part of Northwest Territories in Laurentian Plateau; about 228,160 sq. mi.; mostly tundra region; N-298, *maps* C-68-9, 81
- Keewatin, division of geologic time, *table* G-57
- Keewatin ice sheet I-5, *map* I-6
- Kefauver (*kē-fō'vēr*), Estes (born 1903), political leader, born near Madisonville, Tenn.; five terms in U.S. House of Representatives; elected U.S. senator 1948; chairman Senate Crime Investigating Committee 1950-51 ('Crime in America').
- Kegels, ancient German game B-266
- Kelghley (*kēth'li* or *kē'tli*), town in Yorkshire, England, 55 mi. n.e. of Liverpool; Leeds-Liverpool Canal connects it with Hull; manufactures worsted, tools, machines, paper; pop. 56,938; *map* B-325
- Keijo, Korea. See in *Index* Seoul
- Keitel (*kē'tēl*), Wilhelm (1882-1946), German army officer; captain on war staff in World War I; made commander in chief (1938) of German armed forces; as chief of high command signed Germany's surrender in World War II May 1945; hanged for war crimes Oct. 1946; *picture* W-252
- Keith, Sir Arthur (1866-1955), British anatomist and anthropologist, born Aberdeen, Scotland; a leading authority in study of human race and its antiquity and expert on reconstruction of prehistoric man from fragments or fossil remains ('Ancient Types of Man', 'The Human Body', 'Nationality and Race').
- Keith, Francis Edward James (1696-1758), Scottish soldier, Jacobite adherent, great marshal under Frederick the Great in Seven Years' War; skillful in tactics.
- Kekulé (*kā'kq-lā*), or Kekulé von Stradonitz, Friedrich August (1829-96), German chemist; devised "graphic formulae" for organic chemistry; chemistry of explosives, dyestuffs, and coal-tar products based largely upon his researches benzene B-124
- Kelantan (*kē-lān'tān*), a Malay state; 5750 sq. mi.; pop. 448,572. See also in *Index* Malay States, Unfederated
- Kellm rugs R-247, 248, 250
- Keller, Friedrich Gottlob (1816-95), German weaver of Saxony, patented a machine to make wood pulp for paper P-68b
- Keller, Gottfried (1819-90), German poet and novelist, born Switzerland; ranks high both in poetry and in prose fiction; combines realism with imaginative quality and sincere feeling; wrote 'Der grüne Heinrich' (Green Henry); 'Die Leute von Seldwyla' (Seldwyla Folk).
- Keller, Helen (born 1880), American blind and deaf woman of remarkable achievements K-20, *picture* K-20
- Kellermann (*kē'lēr-mūn*), Bernhard (1879-1951), German novelist; early novels subjective ('The Fool'); later work on social problems ('The Ninth November'; 'The Tunnel').
- Kellermann, François Christophe de (1735-1820), French Revolutionary general, marshal of France, victor at Valmy (1792); father of François Étienne de Kellermann, one of Napoleon's ablest generals.
- Kelley, Edgar Stillman (1857-1944), composer and conductor, born Sparta, Wis.; at Cincinnati Conservatory of Music after 1910 ('New England Symphony'; orchestral suite 'Alice in Wonderland').
- Kellgren, Johan Henrik (1751-95), Swedish poet, critic, and journalist; cofounder and editor *Stockholms-posten*; librarian and private secretary to Gustavus III; wrote excellent lyrics and dramatic poems.
- Kellogg, Clara Louise (1842-1916), operatic soprano, born Sumterville, S.C., toured U.S. with her own company.
- Kellogg, Elijah (1813-1901), minister and writer for the young, born Portland, Me.
- 'Spartacus to the Gladiators at Capua' S-330
- Kellogg, Frank Billings (1856-1937), lawyer and diplomat, born Potsdam, N.Y.; U.S. senator from Minnesota 1917-23; ambassador to Great Britain 1923-24; secretary of state 1925-29; coauthor of Kellogg-Briand Pact to outlaw war; awarded Nobel peace prize for 1929; elected World Court Judge 1930, resigned 1935.
- Kellogg, Vernon Lyman (1867-1937), zoologist, born Emporia, Kan.; professor entomology, Stanford University, 1894-1920; secretary National Research Council 1919-31, after 1931 secretary emeritus; wrote on zoology, entomology, heredity, and evolution.
- Kellogg, Idaho, town 33 mi. s.e. of Coeur d'Alene; pop. 4913; one of largest lead mines in U. S. is here; *map* I-20
- Kellogg-Briand Pact, or Pact of Paris (Treaty for the Renunciation of War, 1928) C-468, A-295 signing of, *picture* P-101
- Kells, market town of County Meath in e. Ireland; of ancient origin; pop. 2125; celebrated *Book of Kells*, beautifully illuminated copy of the Gospels in Latin, preserved in Trinity College Library, Dublin; *map* B-325
- cross, *picture* I-230a
- Kells, *Book* of B-236
- Kelly, Colin P (urdie), Jr. (1915-41), U.S. Army aviator ('America's first hero of World War II'), born Madison, Fla.; in B-17 bomber, Dec. 10, 1941, he attacked Japanese heavy cruiser *Ashigara* (at first he was credited erroneously with sinking the Japanese battleship *Haruna*); killed when his bomber crashed on Mt. Arayat on Luzon after he had ordered crew to parachute to safety.
- Kelly, Erle Philbrook (born 1884), writer and educator, born Amesbury, Mass.; began as newspaper reporter, later professor of journalism at Dartmouth College; lectured at Crakow, Poland, as scholar of Kosciuszko Foundation; author of 'Trumpeter of Krakow', awarded Newbery medal (1929).
- Kelly, George (born 1887), playwright, born Philadelphia, Pa.; in vaudeville 5 years, writing own sketches, also wrote one-act plays; later wrote penetrating plays tinged with satire of middleclass society ('Craig's Wife', won Pulitzer prize 1926; 'The Showoff').
- Kelly, John (1822-86), political leader, born New York City; joined Tammany organization 1853; U.S. congressman 1855-59; sheriff of New York County 1859-61 and 1865-67; opposed "Tweed Ring" and controlled Tammany 1874-82.
- Kelly, Oakley G., aviator transcontinental flight, *table* A-104
- Kelly, William (1811-88), inventor, born Pittsburgh, Pa.; invented process for making steel
- Kelly process I-247
- Kelmescott Manor, home of William Morris M-395
- Kelmescott Press M-395
- foio Chaucer, *picture* B-238
- Kelp, a large coarse seaweed S-94, 95, *pictures* S-94, color *picture* P-287
- Kel'pies, water fairies F-11
- Keltie, Sir John Scott (1840-1927), British geographer, born Dundee, Scotland; editor *Statesman's Year Book* for 43 years ('History of the Scottish Highlands and Cians'; 'The Partition of Africa').
- Kelts. See in *Index* Celts
- Kel'vin, William Thomson, first Baron (1824-1907), British physicist E-308, *picture* E-308
- absolute temperature scale H-319
- age of earth estimated by E-194
- Atlantic cable C-7
- Kemal Atatürk (*kē-mäl' ä-tä-türk'*) (1880-1938), Turkish army officer and statesman; former name Mustapha Kemal; founder of the Republic of Turkey: T-220a-b, *picture* T-220b
- statue, *picture* T-215
- Kem'ble, famous family of English actors (18th and 19th centuries); most celebrated members were Mrs. Sarah Siddons, her brothers John Philip and Charles, and her niece Fanny.
- Kemble, Fanny (Frances Anne) (1809-93), English actress and author, daughter of Charles Kemble; married Pierce Butler, an American, and lived in U. S. 1834-48 ('Journals', interesting picture of American life).
- Kemerovo, industrial city in s.-central Siberia; coal mining; iron, steel, and chemical manufactures; pop. 200,000; *map* A-406
- Kemmel, Mont, isolated rocky hill 6 mi. s.w. of Ypres, Belgium; overlooks Flanders plain to n.e. and s.e.; taken by Germans in World War I, April 26, 1918.
- Kemmerer, Edwin Walter (1875-1945), economist, born Scranton, Pa.; professor economics and finance, Cornell University, 1909-12, Princeton University 1912-43, professor emeritus after 1943; financial adviser to U.S. Philippine Commission, to Mexico, Guatemala, Colombia, Union of South Africa, Chile, Poland, Ecuador, Bolivia, China; author of many works on economics.
- Kemp, William (flourished 1593-1602), English actor and dancer; acted in Elizabethan plays, especially those of Shakespeare; famous for his morris dancing.
- Kemp Coast, district in Antarctica between 56° and about 69° 40' e.; discovered 1833 by Peter Kemp, a British sealing captain; *map* A-259
- Kem'pls, Thomas A. (1380?-1471), German monk and mystic, remembered for one book, 'Imitation of Christ', a classic of devotional literature.
- Ken, Thomas (1637-1711), English

Ker: cape, ät, fär, fäst, whät, fäll; mä, yät, fern, thäre; fce, büt; röw, wón, fôr, nôt, dq; cäre, büt, rüde, füll, bärn; out;

- bishop, one of seven imprisoned for refusing to read Declaration of Indulgences issued by James II; following the revolution, lost bishopric rather than transfer loyalty from James II to William of Orange; remembered today for his hymns. ('Praise God from Whom All Blessings Flow'; 'Awake, My Soul, and with the Sun').
- Kenaf**, a fiber plant, botanically known as *Hibiscus cannabifolius*; original home in India, grown now in Cuba and other Latin American countries, also in Florida; from 8 to 12 ft. high; fiber, which is in bark, used as substitute for jute; because retting process is too costly, widespread growing and use of kenaf depend on development of machines for removing fiber from plant.
- Kenai** (*kē-ni'*) birch B-155
- Kenai Peninsula**, in S. Alaska bordering Cook Inlet; 150 mi. long; farm lands, coal deposits; best harbor, Seward; map A-135
- Kendall**, Amos (1789-1869), newspaper editor and public official, born Dunstable, Mass.; auditor in Treasury Department under Jackson, 1829-35; postmaster general 1835-40; reorganized Post Office Department and paid off debt; S.F.B. Morse's agent in development of telegraph systems; instrumental in founding of Columbia Institute for Deaf.
- Kendall**, Edward C(alvin) (born 1886), biochemist, born South Norwalk, Conn.; isolated thyroxin 1914; professor of physiological chemistry Mayo Foundation for Medical Education and Research, Rochester, Minn., 1914-51, emeritus professor after 1951; won 1950 Nobel prize in medicine (with Drs. P. S. Hench and R. Reichstein) for research on adrenal cortex culminating in use of cortisone in clinical medicine.
- Kendall**, Henry Clarence (1841-82), Australian poet, son of missionary; held government posts at Sydney; journalist at Melbourne 1869-73; wrote of Australian landscape with fine sensitiveness; A-493
- Kendrick**, John (1745?-1800), navigator, born Boston, Mass., died Hawaii; commanded privateer during Revolution; explored n.w. coast of America and Pacific Islands.
- Kenilworth**, England, town in Warwickshire; pop. 10,738; ruins of castle given by Queen Elizabeth I to earl of Leicester; scene of Sir Walter Scott's novel 'Kenilworth'; map B-325
- 'Kenilworth'**, novel by Scott S-69
- Kenilworth ivy**, a creeping perennial plant (*Cymbalaria muralis*) of the figwort family, native to Europe. Trailing stems root at nodes (joints); leaves lobed; flowers lilac with yellow throat, tiny; found in greenhouses, rock gardens; also called mother-of-thousands.
- Kenmore**, N.Y., suburb of Buffalo 6 mi. n.; pop. 20,066; map N-204
- Kenna**, John Edward (1848-93), statesman, born Valcoulan, W. Va. (then Virginia); entered Confederate army during Civil War when 16; after war worked as coal miner, then studied law; admitted to bar 1870; served 3 terms in House of Representatives and 2 in U.S. Senate, where he was prominent Democrat. See also in Index Statuary Hall (West Virginia), table
- Ken'nan**, George (1845-1924), traveler, writer, and lecturer, born Norwalk, Ohio; telegraphic engineer and explorer in Russia and Siberia ('Siberia and the Exile System'; 'Edward H. Harriman').
- Kennebec** (*kēn'ē-bēk*) River, 2d largest river of Maine; rises in Moosehead Lake, flows s. 190 mi. to Atlantic; maps M-46, 52-3
- Kennedy**, Charles Rann (1871-1950), American actor and dramatist, born England; husband of Edith Wynne Matthison; plays are serious and religious in tone ('The Servant in the House').
- Kennedy**, John Pendleton (1795-1870), pen name Mark Littleton, author and statesman, born Baltimore, Md.; fought in War of 1812; Whig member from Md. of U.S. House of Representatives 1838, 1840, 1842; secretary of the navy 1852-53; A-226b-c, 229
- Kennedy**, Joseph Patrick (born 1888), banker, business executive, and statesman, born Boston, Mass.; chairman, Securities and Exchange Commission 1934-35; chairman U.S. Maritime Commission 1937; ambassador to England 1937-40.
- Kennedy**, Leo (born 1907), Canadian poet, born Liverpool, England; moved to Canada 1912 ('The Shrouding'); C-106a
- Kennedy**, Margaret (Mrs. David Davies) (born 1896), English novelist; absorbing narrator, skilled in depicting unconventional characters ('The Constant Nymph'; 'Return I Dare Not'; 'Together and Apart'; 'The Feast').
- Kennel Club**, American D-120
- breeds and standards, tables D-118-19
- Kennelly**, Arthur Edwin (1861-1939), American electrical engineer, born Bombay, India; principal electrical assistant to Thomas Edison 1887-94; professor of electrical engineering at Harvard University after 1902.
- Kennelly-Heavyside layer**, of upper atmosphere; suggested by Oliver Heavyside and A. E. Kennelly: R-40, R-30b diagram A-455, table A-454 sunspots affect S-453
- Ken'nesaw Mountain**, a height 25 mi. n.w. of Atlanta, Ga., where Confederates repulsed Sherman's army June 27, 1864; a national battlefield park; maps G-76, C-334
- Kenneth I**, MacAlpine (died 860?), king of the Scots and conqueror of the Picts, often called first king of Scotland S-64
- Kennewick**, Wash., city 129 mi. s.w. of Spokane, on Columbia River opposite Pasco; pop. 10,106; fruit and vegetable irrigated farming; processed food; map W-45
- Kenny**, Elizabeth (1886-1952), Australian nurse (addressed as "Sister") K-20, picture K-20
- Kenora**, Ontario, Canada, manufacturing center and summer resort on Lake of the Woods, 130 mi. e. of Winnipeg, Manitoba; pop. 8695; flour, lumber, pulp and paper mills, boat factories, fisheries; gold, silver, copper, mica nearby; maps C-68, 72
- Keno'sha**, Wis., manufacturing city and port on s.w. shore of Lake Michigan, 33 mi. s. of Milwaukee; pop. 54,368; map, inset W-172
- Industries W-175, 178**
- Kensico Reservoir**, in New York A-283
- Kensington**, borough of W. London, England; pop. 168,054; Kensington Palace (birthplace of Queen Victoria) and Gardens; residence of William Makepeace Thackeray
- Peter Pan statue, picture B-60
- Kensington Stone**, a stone dug up in 1898 near Kensington, Minn., bearing an inscription in runic characters indicating that a party of Norse explorers camped there in 1362. Believed by some scholars to be authentic, by others, false. Loaned to Smithsonian Institution, Washington, D.C., by Alexandria, Minn., Chamber of Commerce 1948.
- Kent**, Edward Augustus, duke of (1767-1820), English prince, 4th son of George III; father of Queen Victoria.
- Kent**, James (1763-1847), jurist and author, born Fredericksburg, Putnam County, N.Y.; his 'Commentaries upon American Law' is a legal classic which has exerted an influence comparable to that of Blackstone's 'Commentaries' Hall of Fame, table H-249
- Kent**, Lonise Andrews (born 1886), author, born Brookline, Mass.; books for adults: 'Mrs. Appleyard's Kitchen' and 'Mrs. Appleyard's Year'; for children, wrote historical stories: 'He Went with Marco Polo'; 'He Went with Christopher Columbus'; 'He Went with Magellan'.
- Kent**, Roekwell (born 1882), American artist and author K-20-1, picture K-21
- 'Moby-Dick', pictures W-111, A-227
- Mount Equinox in Vermont, picture K-21
- wood engraving E-386
- Kent**, ancient kingdom of Anglo-Saxons in England; settled by Jutes; conquered by Egbert, king of Wessex, and became part of Wessex; map E-358
- Kent**, county of s.e. England; 1525 sq. mi.; pop. 1,563,286; called "garden of England" from its rich soil and picturesque scenery; first landing place of Anglo-Saxon invaders; map E-347
- Canterbury and early kingdom C-114
- Joseph Conrad in C-451
- Kent**, Ohio, city 11 mi. n.e. of Akron; pop. 12,418; Kent State University; map O-356
- Kent Island**, largest island in Chesapeake Bay, Md., 7 mi. e. of Annapolis; oyster fisheries; map M-117
- Chesapeake Bay Bridge M-109, picture C-223a. See also in Index Bridge, table
- first settlement in Maryland M-110
- Kenton**, Simon (1755-1836), pioneer, born Fauquier County, Va.; in 1775 went to Kentucky with Boone, captured by Indians while stealing horses, 1777. was tied naked to back of a horse which was turned loose; later released to British troops; escaped back to Kentucky.
- Kenton**, Stanley (Stan) (born 1912), composer and bandleader, born Wichita, Kan.; organized own band 1941; exponent of "progressive jazz."
- Kent State University**, at Kent, Ohio; founded 1910; arts and sciences, business administration, education; graduate school.
- Kentucky**, an e.-central state of U.S.; 40,395 sq. mi.; pop. 2,944,806; cap. Frankfort: K-21-34a, maps K-30-1, 23, 27, U-253, 274-5, pictures K-21-2, 24, 34-34a
- agriculture K-23, 26
- bird, state K-25
- Capitol, State, picture K-34a
- cities K-24, 27, map index K-29, 32-3. See also in Index names of cities
- Frankfort F-278
- Louisville L-335-6, picture L-335
- climate K-25
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 geographic region in which situated, maps U-250, 274-5: The South U-272-83
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 Abraham Lincoln N.H.P. N-30, picture K-34
 Cumberland Gap N.H.P. Project N-33, picture K-22
 Mammoth Cave N.P. C-156-7, N-36, pictures C-157
 people: mountaineers K-24
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 products K-23, 24, 26
 rivers K-25: Ohio O-362-3
 seal K-25
 song, state F-248
 trade, wholesale and retail K-26
 transportation K-23, 25
 tree, state K-25
 Kentucky, University of, at Lexington, Ky.; state control; founded 1863; arts and sciences, agriculture, commerce, education, engineering, law, pharmacy; graduate school.
 Kentucky coffee tree, a medium-sized tree (*Cynmocladus dioicus*) of the pea, or pulse, family; so-called because its seeds resemble coffee beans; leaves with 7 to 13 leaflets; flowers in clusters of white pealike blossoms; grows w. of Appalachian Mountains to Great Plains.
 Kentucky Dam, in Kentucky, on Tennessee River D-11b, map K-30. See also in Index Dam, table
 Kentucky Derby, the foremost race in the United States for running horses, held every May since 1875 at Churchill Downs, Louisville, Ky.
 Kentucky Resolutions A-14, J-332b, S-385, U-372
 Kentucky rifle F-78, picture F-77
 Kentucky River, in Kentucky, formed by several forks, rising in Cumberland Mts. of s.e.; flows 250 mi. n.w. to Ohio River: maps K-23, 30-1
 Kentucky State College, at Frankfort, Ky.; state control; for Negroes; founded as normal school 1886; arts and sciences, applied sciences, education.
 Kentucky warbler, picture W-7
 Kentucky Wesleyan College, at Owensboro, Ky.; Methodist; opened 1866; arts and sciences.
 Kenya, colony and protectorate, part of British East Africa on Indian Ocean s. of Ethiopia; 224,960 sq. mi.; pop. 5,410,281; cap. Nairobi: K-34a-5, E-198, maps E-199, A-46, pictures K-34a-5
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elephants in a game reserve, color picture A-36
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 relationships in continent, maps A-46-7, 41-2, 39, 51
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 Victoria Nyanza borders V-471
 Ken'ya, Mount, volcanic peak (17,040 ft.) in Kenya Colony, Africa, near equator; discovered 1849; first ascended 1899: K-34a, b, maps A-46, E-199, picture K-34a
 Kenya and Uganda Railways. See in Index Uganda Railway
 Ken'yahs, tribe in Borneo, of good physique and intelligence, skilled in metalwork and carving.
 Ken'yoa College, at Gambier, Ohio; for men; founded 1824 (at Worthington, moved 1827 to Gambier); Protestant Episcopal; arts and sciences, theology.
 Ke'okuk ("one who moves alertly") (1780?-1848), American Indian of the Fox clan; became leader of Sauks and Foxes and secured for them the territory of Iowa from the government; buried in Keokuk, Iowa, which was named for him. His son, Moses Keokuk (1818?-1903) was a famous Indian orator.
 Keokuk, Iowa, manufacturing city on Mississippi and Des Moines rivers in s.e. corner; pop. 16,144; cereals, steel and rubber products, carbide, shoes: maps I-215, U-253
 dam I-219
 Kephallenia (*kyé-fá-lyé-nyé'ü*), or Cephalonia (*séf-a-ló-ni-a*), mountainous Greek island w. of mainland; largest of Ionian group; about 290 sq. mi.; pop. 57,834; currants and other fruit, olives, olive oil: maps G-189, B-23
 earthquake (1953) E-197
 Kephart, Horace (1862-1931), author, born East Salem, Pa. ('Camping and Woodcraft')
 camp clothing and equipment C-57
 Kep'ler, Johannes (1571-1630), German astronomer K-35-6, A-444, picture A-428
 improves telescope T-46, K-36
 story of trip to moon S-309
 Kepler's laws of planetary motion K-36
 Keppel, Frederick Paul (1875-1943), educator, born Staten Island, N. Y.; dean of college, Columbia University, 1910-18; assistant secretary of war 1918-19; president Carnegie Corporation 1923-41.
 Kerat'to, also karatto, name of several West Indian agaves and their fibers.
 Kerazeh, Palestine. See in Index Chorazin
 Kerbela, Iraq. See in Index Karbala
 Kerch (*kér-h*), Russia, Crimean port between Black and Azov seas, on Kerch peninsula; pop. 104,471; iron mining; suffered in Crimean War: maps R-267, B-204
 Keren'sky, Alexander Feodorovich (born 1881), Russian revolutionary statesman, head of the provisional government of 1917; fled to Paris, France, when Bolsheviks overthrew his government Oct. 1917; moved to United States 1940: R-288
 Keres, or Queres (*ká-rás*), a linguistic stock of North American Indians living in pueblos on the Rio Grande and Rio Jemez and westward in New Mexico.
 Kerguelen (*kúr-gè-lén*) Island, a desolate uninhabited volcanic island 85 mi. long on s. border of Indian Ocean midway between Cape of Good Hope and Australia; French possession, dependency of Madagas-

car; discovered 1772 by Yves Joseph de Kerguelen-Trémarec: map W-205
 Kerguelen-Trémarec (*kér-gá-lén-trá-má-rék'*), Yves Joseph de (1734-97), French explorer; discovered (1772) what he thought was rich new southern continent in Antarctic and named it South France; realizing it was only a barren island, renamed it Isle of Desolation; later called Kerguelen Island.
 Kerk'ya, island in Ionian Sea. See in Index Corfu
 Kermadec (*kér-mád'ek*) Islands, group in Pacific about 600 mi. n.e. of New Zealand, to which it was annexed in 1887; total area, 13 sq. mi.; pop. 23; Raoul, or Sunday Island, largest, 20 mi. in circumference: map P-16-17
 Kerman, or Kirman (*kér-mán'*), ancient Carmana, Iran, in s.e.; capital of province of same name; pop. 53,464: maps I-224, A-406, P-156
 rug, color picture R-249
 Kermanshah (*kér-mán'shā*), city in w. Iran; pop. 102,759; on road between Baghdad and Tehran; trade in grain, fruit, rugs; notable also for ruined walls: maps I-224, A-406
 Kern, Jerome (1885-1945), composer, born New York City; wrote many musical comedies and operettas
 operettas O-398
 Kernite, or rasorite, mineral yielding borax B-252; M-265
 Kern River, stream rising in mountains of s.e. California; flows s.w. and n. to Lake Tulare: map C-35
 Kerogen, a substance in oil shale P-181
 Ker'osene, or coal oil, a mineral oil distilled from petroleum P-179, charts P-175-7
 fire prevention F-90, picture F-89
 first used P-179
 lamps and lighting L-89
 soaps contain S-213
 Kerr, Sophie (Mrs. Sophie Kerr Underwood) (born 1880), writer and editor, born Denton, Md. ('Love at Large'; 'Confetti'; 'Curtain Going Up').
 Kerr Dam (Polson Dam), in Montana, on Flathead River M-377. See also in Index Dam, table
 Ker'ry, county of s.w. Ireland in province of Munster; 1815 sq. mi.; pop. 126,644; beautiful mountain scenery; lakes of Killarney: map I-227
 Kerry blue terrier, color picture D-111, table D-118b
 Kerry cattle C-145
 Kersey, thick woolen cloth similar to melton.
 Kerst, Donald William (born 1911), physicist, born Galena, Ill.; at University of Illinois, invented betatron betatron A-462a, X-332, picture A-462a
 Kertch, Russia. See in Index Kerch
 Kesselring, Albert (born 1885), German army officer; led air attacks on Poland 1939, on Netherlands, Belgium, Britain 1940, on Russia 1941-42; became commander in Italy 1943, in west 1945; death sentence for war crimes in Italy commuted to life imprisonment, later to 21 years; freed by British 1952; wrote 'Kesselring: a Soldier's Record'.
 Kes'teven, Parts of, administrative district in Lincoln County, England, map E-347
 Kes'trel, or windhover, a bird of prey, one of smallest of true falcons (*Falco tinnunculus*) found throughout Old World; resembles common sparrow hawk of America to which it is related; strong flier, hovers for minute or two in one spot.
 Keta salmon, dog salmon, or chum salmon S-28
 Ketch, a sailboat, picture B-216

Ker: cápe, át, fár, fást, what, fáll; mē, yét, fēr, thérē; tce, bit; rōw, wón, fōr, nót, dq; cūro, būr, rydc, füll, búrn; out;

Ketchikan, Alaska, town and port of entry in s.e. Alaska 235 mi. s.e. of Juneau; pop. 5305; served by steamships from Seattle and Vancouver; center for fishing, salmon canning, lumbering, mining, fox farming: *maps* A-135, N-250

Ketchwayo. *See in Index* Cetewayo

Ketones, in chemistry O-424b-c

formula, diagram O-424b

Ket's Rebellion. *See in Index* Kett's Rebellion

Kettering, Charles F(ranklin) (born 1876), engineer and inventor, born near Loudonville, Ohio; originated Delco electric power and light generating unit for farmhouses; president and general manager General Motors Research Corporation electric automobile starter A-505 guided missiles G-225

Kettledrums, or tympani D-156, *picture* M-471

Kettle Hill, Cuba. *See in Index* San Juan Hill

Kett's, or Ket's, Rebellion, a revolt in Norfolk, England (1549), led by William and Robert Kett against the unlawful closing off from the people of common land; suppressed, at great loss to rebels, by forces under leadership of earl of Warwick; Kett brothers executed.

Keuka College, at Keuka Park, N.Y.; Baptist; for women; founded 1921; arts and sciences.

Kew (*kū*), residential suburb of London, England; famous for its extensive botanical gardens

Kew Gardens B-261

Kewanee (*kē-wōn'ē*), Ill., manufacturing city 41 mi. n.w. of Peoria; pop. 16,821; coal mining; boilers, gloves, fittings: *map* I-36

Kewau'nice, Wis., port on Lake Michigan 25 mi. e. of Green Bay; pop. 2582; important shipping point car ferry terminal M-230, *map* W-173

Kew barometer, or marine barometer B-59

Keweenaw (*kē-wē-nō'ān*), division of geologic time, *table* G-57

Keweenaw (*kē-wē-nā*) Bay, inlet of Lake Superior in n. peninsula of Michigan, *maps* M-219, 226

Keweenaw Peninsula, in Lake Superior, northernmost projection of Michigan C-473, *map* M-226 copper mining S-457

Kew Gardens, officially Royal Botanic Gardens, near London, England; 288 acres: B-261

Kewpie, doll D-122

Key (*kā*), Ellen (1849-1926), Swedish social writer and feminist ('The Century of the Child'; 'The Woman Movement').

Key (*kē*), Francis Scott (1779-1843), American lawyer K-36, *picture* K-36 writes 'Star-Spangled Banner' N-40, K-36; inspired by Fort McHenry flag F-130d, *picture* W-12, *color picture* F-128; words N-41

Key, in music. *See in Index* Music, *table* of musical terms and forms

Key, of chart G-158

Key, sending instrument in telegraphy T-38, *pictures* T-37

Keyboard, piano, variations of P-250

Keyes (*kīz*), Frances Parkinson (born 1885), novelist, born Charlottesville, Va. ('Queen Anne's Lace'; 'The Great Tradition'; 'All That Glitters'; 'The River Road'; 'Come a Cavalier'; 'Dinner at Antoine's'; 'Joy Street'; 'Steamboat Gothic').

Keyhole limpet, limpet with hole at tip of shell.

Keynes (*kānz*), John Maynard (1883-1946), first Baron, English econo-

mist; advocated government spending in time of economic crisis to create mass purchasing power; influenced economic policies of 'New Deal' in U. S.; became member of board of directors of Bank of England 1941; originator of a compulsory savings plan ('The Economic Consequences of Peace'; 'The General Theory of Employment, Interest and Money').

Keys, Florida. *See in Index* Florida Keys

Keys, House of, Isle of Man M-71

Keys and locks L-289, *picture* L-289 time locks, in banks, *picture* B-49

Keyserling (*kī'zēr-līng*), Hermann, Count (1880-1946), German philosopher, born Königsberg, near Reval, Livonia (now Estonia) of wealthy German-speaking nobility; studied at Geneva, Dorpat, Heidelberg, Vienna; traveled extensively; inspired by Eastern thought; founded School of Wisdom at Darmstadt ('The Travel Diary of a Philosopher'; 'Europe'; 'The Recovery of Truth'; 'America Set Free').

Key signature, in music. *See in Index* Music, *table* of musical terms and forms, Signatures

Keystone, in arch A-297, *pictures* A-297, M-159

Keystone Province (Manitoba, Canada) M-78

Keystone State, popular name for Pennsylvania P-121

Key West, Fla., winter and health resort on island about 100 mi. n. by e. of Havana, Cuba; pop. 26,433; K-37-8, F-164, *maps* F-159, U-253, *picture* K-37

Khabarovsk (*kū-bā'rūfsk*), Russia, city in e. Siberia, about 400 mi. n.e. of Vladivostok, near junction of Amur and Ussuri rivers; terminal of branch of Trans-Siberian R.R.; pop. 300,000; trade, industrial, and educational center: *map* A-406

Khachaturian (*kā-chā-tū'ri-ān*), Aram (born 1903), Russian composer, born Tiflis; work shows influence of Eastern folk music ('Gayne', a ballet; 'Concerto for Piano and Orchestra'): R-275

Khadija (*kā-dē'jā*), wife of Mohammed M-329

Khafre (*kā'frā*), or Chephren, king of Egypt (2560 B.C.)

pyramid P-446, *picture* P-446

Sphinx, a portrait of S-338-9, *picture* S-338

statue, *picture* E-278b

Khairpur (*kī'r'pur*), princely state of west Pakistan, administratively associated with Sind province; area 6050 sq. mi.; pop. 319,543; cap. Khairpur; before joining Pakistan in 1948, Khairpur was a princely state affiliated with India: *map* I-68a

Khaki (*kā'kī* or *kā'ki*) (Indian word meaning "earth color"), a drab cotton material used for army uniforms U-234, 235

Khalkidike (*kāl-kyē-thē-kyē'*), or Chalcidice (*kāl-sid'i-sē*), ancient name of peninsula in n.e. Greece with three smaller peninsulas projecting into Aegean Sea.

Khalkis, or Chalcis (*kāl'kīs*), Greece, chief town of island of Evvola; pop. 26,097: *maps* G-189, E-417 Aristotle flees to A-340

Khamshu (*kām'shū* or *kām-sēn'*), hot, sand- or dust-laden wind blowing in Egypt in late spring. It is supposed to continue about 50 days, *khamshū* being the Arabic word for "fifty": S-15, E-272

Khan (*kān*), Liaquat Ali (1895-1951), Indian political leader; prominent

Moslem since 1923; prime minister of Pakistan 1947-51; assassinated.

Khan, in Orient, large unfurnished inn, generally surrounding a court, for traders and their caravans, a resthouse

Damascus D-12

Khan, title applied to rulers among Tatars, also to persons of various ranks in Iran, Turkey, India, Pakistan, and other eastern countries.

Khanla (*kā-nyā'*), also Canea (*kā-nē'a*), seaport and capital (since 1841) of Crete, on n.w. shore; pop. 33,837: C-511, *maps* G-189, T-215, E-417

Kharga (*kār'gā*), oasis in Libyan Desert, *map* E-271

Kharkov, or Kharkof (*kār'kōf*), Russia, important manufacturing city and one of largest cities of Ukraine; railway and aviation center; pop. 900,000: K-38, *maps* R-267, E-417 World War II K-38, W-266

Khartoum, also Khartum (*kār-tōm'*), capital of Sudan, (former Anglo-Egyptian Sudan), at union of Blue Nile and White Nile rivers; pop. 37,450; trade center on Cape-to-Cairo route; Gordon College: *maps* A-46, A-285, A-531, *pictures* S-441-2a

Kitchener captures K-52

Mehemet Ali builds E-278

siege of G-141

Khattushash, Hittite capital H-386

Khaya (*kā'ya*), a genus of tropical trees of the mahogany family native to Africa from Gambia to Madagascar. Grows to 150 ft. with a trunk 80 ft. to 100 ft. high; trees reach maturity at 100 yrs. Wood, often called Africa mahogany, has pale rose to dark red-brown heartwood, gray white to red-brown sapwood; 4 species, dry-zone, red, white, and bigleaf khaya make up bulk of this wood and they often appear in trade under name of port from which shipped, as "Benin mahogany," "Lagos mahogany." Used as veneer for furniture; lumber used for ships, boats, and caskets.

Khayyam, Omar. *See in Index* Omar Khayyam

Khelat, west Pakistan. *See in Index* Kalat

Kherson (*kēr-sōn'*), port on Dnieper River in s. Russia, 100 mi. e. of Odessa; pop. 97,186; grain and woolen mills, tobacco manufactures: *maps* B-204, R-267

Khingan (*shīng'ān'*), name of two mountain ranges in Manchuria: (1) Great Khingan Mountains, sometimes called simply Khingan Mountains (highest point about 5670 feet), in w. Manchuria at edge of Mongolian plateau; (2) Little Khingan Mountains, a continuation (highest point about 4665 feet), in n.e. Manchuria w. and s. of Amur River: *maps* M-72, C-259, R-259, A-406

Khios (*kē'ōs*), Chios (*kī'ōs*), or Scio (*shē'ō*), fertile island in Aegean Sea w. of Smyrna; 320 sq. mi.; pop. 72,777; ancient Greek colony; reputed birthplace of Homer; ceded to Greece by Turkey 1913: *maps* A-27, G-189, E-417

Khiva (*kē'vā*), former Khanate and its capital in Russian Turkestan; in ancient times a great kingdom; following Russian Revolution became a soviet republic, later divided between republics of Turkmenistan and Uzbekistan; city of Khiva (pop. 25,000), 130 mi. s. of Lake Aral, now in Uzbekistan: *map* A-406

Khmers (*k'émérz*), people inhabiting Cambodia, parts of Siam (Thal-

land), and s. Cochín-China; tall and muscular with large, dark eyes; remnants of cultured ancient race; according to tradition came from India: I-123, 125. *See also in Index* Angkor

Khnum (*k'nyum*), ancient Egyptian god E-283, 284

Khorasan (*k'ra-sān*), or **Khurasan** (*k'ra-sān*), mountainous province of n.e. Iran rainfall R-71

Khorsabad, Iraq. *See in Index* Dur Sharrukin

Khotan, Sinkiang, China. *See in Index* Hotien

Khotana (*kō-tā-nū'*), Indian tribe that lives in Alaska, map I-106f, table I-107

Khrushchev (*krush-chōf'*), Nikita Sergeevich (born 1894), Russian Communist party leader, born in Donets River basin, Russia; elected full member of Politburo 1939; head of Communist party of Ukraine 1938-46 and Dec. 1947-Dec. 1949; first secretary of Moscow district Dec. 1949-March 1953; became member of Communist party secretary of Soviet Union Dec. 1949, first secretary 1953-: R-292a, picture R-292a

Khufu (*k'ō'fō*), or **Cheops** (*k'ē'ōps*), king of Egypt (2600 B.C.)

Great Pyramid P-446, picture P-446

Khurasan, Iran. *See in Index* Khorasan

Khus-khus. *See in Index* Vetiver

Khyber (*k'ibēr*) Pass, narrow mountain pass between Pakistan and Afghanistan; length 33 mi.; great strategic importance for 2000 years: A-31, 32, maps I-54, A-33, A-406, picture A-33

British fort, picture A-31

Kiamusze, or **Chiamussu** (*gi-ā'mu'su'*), Manchuria, city on Sungari River about 190 mi. n.e. of Pinkiang (Harbin); pop. 168,000; river port and rail terminus; lumber, brick, tile; soybean and flour mills.

Kiang (*k'āng*'), wild ass A-425, picture A-424

Kiangsi (*gi-āng'sē'*), an inland province of China; 77,801 sq. mi.; pop. 12,725,187; cap. Nanchang; coal, iron, copper, tea, silk: map C-260 early porcelain making P-394, 396a

Kiangsu (*gi-āng'su'*), a maritime province of central China; 41,830 sq. mi.; pop. 36,052,011; cap. Nanking; chief city Shanghai; one of China's richest and most fertile regions: map C-260

Klaohow (*gi-ou'gō'*), town, bay, and district on e. coast of Chinese province of Shantung, map C-260 Japan's interests J-321

Klbo, Mount, in Tanganyika Territory. *See in Index* Kilimanjaro

Kickapoo Indians, tribe of Algonquian stock; closely related to Sauk and Fox; first known in central Wisconsin; moved s. into Wabash River region of Indiana and Illinois, some as far s. as Mexico; later parts of tribe removed to Indian Territory.

Kicking Horse Pass, in Rocky Mts. of e. British Columbia, Canada; 5296 ft. high; traversed by Kicking Horse River; magnificent scenery.

Kid, goatskin leather glove manufacture G-126

imitation G-129

kinds L-150

Kidd, Benjamin (1858-1916), English sociologist; his 'Social Evolution' (1894) is one of the most widely read books in its field, having been translated into many languages.

Kidd, Michael (born 1919), dancer and choreographer, born New York City; has danced with leading bal-

let companies in U. S.; created ballet 'On Stage!', also has staged dances and musical numbers for musical plays

'Finian's Rainbow', picture D-141

Kidd, William, Captain (1645?-1701), British pirate K-38-9, color picture K-38

home, picture A-199

Kidderminster, England, town in Worcestershire on Stour River; pop. 37,423; noted for manufacture of carpets: map B-325

Kidderminster carpet R-250

'**Kidnapped**', a tale of adventure by Robert Louis Stevenson (1886) in which the hero, David Balfour, after being kidnapped and cast away on a desert island meets the Jacobite, Alan Breck Stewart. 'David Balfour', a sequel, completes their adventures.

Kidney bean, kidney-shaped seed of the common bean type B-84

Kidney cotton, or **Brazilian** cotton C-498

Kidneys, in human body K-39, color picture P-243

Kido (*kē'dō*), Takayoshi (1832-77), Japanese statesman, plotted and carried through the coup d'état of 1868; advocate of Western civilization and constitutional government; founder of first real Japanese newspaper.

Kidron, Valley of. *See in Index* Kedron

Kiev, Russia. *See in Index* Kiev

Kieffer pear P-105

Kieft (*kēft*), William (Wilhelmus) (died 1647), director general of Dutch colony of New Netherland 1638-47; unpopular for his tyrannical methods; held responsible for massacre of River Indians 1643 and beginning of disastrous wars between colonists and Indians prohibits smoking, picture I-254

Kiel (*kēl*), Germany, former naval port of Germany on Baltic; pop. 254,449; former shipbuilding center; university; terminus of Kiel Canal; scene of German naval mutiny in 1918: maps G-88, E-416, 424

Kiel, Peace of, treaty by which Denmark ceded Norway to Sweden in 1814, as compensation for Sweden's having lost Finland to Russia. By an Act of Union (1815) Norway was to be independent of Sweden, but with the same king.

Kiel Canal, n.w. Germany, strategic and commercial canal in Schleswig-Holstein, s. of Denmark; connects the Baltic and the North seas; runs from Holtenau on the Baltic to Brunsbüttelkoog at estuary of the Elbe River: C-108, maps N-301, G-88, picture G-92. *See also in Index* Canals, table

Helgoland protects H-331

Kielce (*kē-yēl'sū*), Poland, city in mountains 95 mi. s. of Warsaw; pop. 62,113; manufactures hemp, brick, paint: map E-417

Klelland (*chyl'land*), Alexander (1849-1906), Norwegian novelist; keen psychologist and critic of society in charming, witty manner ('Garman and Worse'; 'Skipper Worse'; 'Snow'; 'Jacob').

Klenzl (*kēn'ts'l*), Wilhelm (1857-1941), Austrian composer; songs, instrumental pieces, and operas; wrote music for 'Oesterreichische Bundeshymne', patriotic song of Austrian republic.

Klepura (*kyē-pū'rā*), Jan (born 1902?), Polish operatic tenor, born Sosnowiec, Poland; European debut, Warsaw, 1925; American debut, Chicago Civic Opera House, 1931; often called 'Polish Caruso'; also popular as motion-picture star.

Kierkegaard (*kēr-kū-gård'*), Søren (1813-55), Danish philosopher and theologian; influenced religious thought and literary style in Denmark; some of his principles and ideas adopted by existentialists.

Kieselghnr. *See in Index* Tripoli powder

Kiev (*kē'yēf*), capital of the Ukrainian Soviet Socialist Republic; pop. 900,000: K-39, maps R-267, E-417

Christianity introduced R-272

early history R-284

World War II K-39, W-266

Kikuyu, Negro people of East Africa dwelling in highlands w. of Mt. Kenya; rather small but strong and muscular: K-34b-5, picture K-34b, color picture A-35

shelter, picture K-34b

Kilauea (*kē-lou-ā'ū*), volcano in Hawaii, part of Hawaii National Park: H-288, N-35, map H-286

lava, picture L-138

projects for industrial use V-520

Kildare (*kil-dār'*), county of e.-central Ireland in province of Leinster; 654 sq. mi.; pop. 66,437; chiefly agricultural; Kildare is county seat: map I-227

Kildare, old town in County Kildare, Ireland, 30 mi. s.w. of Dublin; pop. 2286; originated in nursery founded 5th century by St. Bridget: map B-325

Kilimanjaro (*kil-ē-mān-gō'rō*), volcanic mountain, in n. Tanganyika Territory, with two main peaks linked by saddle 7 mi. long: Mt. Kibo (19,319 ft.), highest peak of Africa, and Mt. Mawenzi (over 16,890 ft.): maps A-47, E-199, picture E-198

height, comparative. *See in Index* Mountains, table

Kilindini, Kenya. *See in Index* Mombasa

Kilkenny, town in Ireland, 65 mi. s.w. of Dublin; pop. 10,572; 2d largest cathedral in Ireland; capital of Kilkenny County (796 sq. mi.; pop. 65,235); the story of the Kilkenny cats which fought until nothing but their tails were left is said to be a satire on the long-standing boundary dispute between Kilkenny and its neighbor, Irish town: maps B-325, I-227

Killarney (*kil-lār-nē*), Ireland, market town in s.w.; pop. 6298: K-40, map B-325, picture K-40

Killarney Lakes, Ireland K-40, maps B-321, 325, picture K-40

Killdeer, or **killdee**, a North American type of plover P-321, color picture B-180

egg, color picture E-268a

nests on ground B-172

Kill Devil Hill National Memorial, at Kitty Hawk, N.C. N-38d, picture N-268

Killer whale. *See in Index* Grampus

Killiecrankie (*kil-i-krāng'ki*), pass in Perthshire, Scotland; Viscount Dundee, leader of Jacobite Highlanders, killed in victory over royal forces in 1689.

Killifish, or **mummichog**, a mudfish M-444, 445

Kill van Kull (*kil vān kūl*), strait connecting Upper New York Bay and Newark Bay, between Staten Island, N. Y., and Bayonne, N. J.: map N-222

Bayonne Bridge B-308, picture B-311

See also in Index Bridge, table

Kilmainham Treaty, agreement between William Gladstone and Charles Stewart Parnell, signed at Kilmainham, western suburb of Dublin, Ireland.

Kilmarnock (*kil-mār'nōk*), Scotland.

- town on Kilmarnock Water, in Ayrshire. 20 mi. s.w. of Glasgow; pop. 42,120; textiles, machinery; first edition of Robert Burns's poems published here 1786: *map* B-324
- Kilmer, (Alfred) Joyce** (1886-1918), American poet, essayist, journalist K-40, *picture* K-40
poem "Trees" quoted A-295
- Kilmer, Aline** (Mrs. Joyce Kilmer) (1888-1941), poet and essayist, born Norfolk, Va. ('Candles That Burn', poems; 'Hunting a Hair Shirt and Other Essays').
- Kila (kil)**, oven for burning or baking industrial products
brick B-302, 304, *picture* B-303
cementmaking C-166, *pictures* C-164-5
early types C-167
pottery P-400, *pictures* P-399, O-349, E-355
- Kiloyeyle**, in radio R-35
- Kilogram**, a unit of weight in the metric system (2.204 lbs.) M-184
international, *picture* W-86
- Kiloliter**, a unit of volume in the metric system (264.17 gals.) M-184
- Kilometer**, a metric unit of length (3280 ft.) M-184
- Kilowatt-hour**, *table* E-344c
- Kilpatrick, Hugh Judson** (1836-81), Union general in Civil War; brilliant cavalry leader; commanded cavalry of Sherman's army (1864) in march from Atlanta to Savannah.
- Kilpatrick, William Heard** (born 1871), educator, born White Plains, Ga.; professor philosophy of education, Teachers College, Columbia University
project method E-250
theory of education E-244
- Kil't D-144, S-63a, picture S-63a**
- Kil'wa Kilin'je**, seaport of Tanganyika Territory; pop. 3000; Kilwa Kisiwani, an ancient city, is on an island 25 mi. south of Kilwa Kivinje: *map* E-199
- 'Kim'**, novel by Kipling in which the hero, Kimball O'Hara, nicknamed "Kim," a precocious Irish vagabond, roams through India with a Tibetan priest K-50
- Kimball, Dan Abel** (born 1896), industrialist and public official, born St. Louis, Mo.; served in World War I; secretary of the navy 1951-53.
- Kimberley**, South Africa, diamond-mining center, Cape of Good Hope Province, Union of South Africa; pop. 64,986, with suburbs: *map* A-47
besieged in Boer War B-220
diamond mines D-80, S-245
Rhodes at R-144
- Kimberlite**, a blue rock D-80, *diagram* D-80
- Kimmel, Husband E(dward)** (born 1882), U. S. Navy officer, born Henderson, Ky.; commander in chief of U. S. Fleet, in Hawaii at time of Japanese attack on Pearl Harbor 1941; relieved of command; found "remiss in duties" 1946; errors were officially minimized 1948 by Ernest J. King, wartime chief of naval operations.
- Kimono**, Japanese garment J-303, *pictures* J-302, 305, T-32
- Kinchinjunga**, mountain in e. Himalayas. See in *Index* Kanchenjunga
- Kinck (kingk)**, Hans (1865-1926), Norwegian writer of psychological novels and dramas ('The Avalanche', a novel; 'The Cattle Dealer', a play).
- Kindergartens and nursery schools** K-41-4, *pictures* K-41-3
classroom, *pictures* K-41, E-245
Froebel F-297
Montessori method M-379
- Russia R-273-4**
- Kindler, Hans** (1893-1949), American conductor and cellist, born Rotterdam, Netherlands; debut, Berlin Philharmonic, at 17; came to U. S. 1914; founder and conductor, National Symphony Orchestra, Washington, D. C., 1931-49.
- Kindling** C-61
art of splitting C-60, *picture* C-60
- Kinematics**, branch of mechanics which treats of pure motion in space and time without reference to mass of bodies moved or forces moving them.
- Kinescope**, in television T-54c, a
- Kinesthetic sense**, or muscle sense S-99, T-159
learning and L-144
- Kinetic energy**, in physics, energy of matter in motion E-344-344a, H-316, M-162, *picture* E-344a
- Kinetics**, branch of dynamics which deals with effect of forces upon motions of material bodies.
- Kinetic theory of matter** M-142b
- Kinotoscope**, early motion-picture projector M-432
- King, Basil (William Benjamin)** (1859-1928), Canadian poet and novelist; wrote numerous romances with strong religious undertone, later developing into spiritualistic tendencies ('The Inner Shrine'; 'Wild Olive'; 'The Street Called Straight'; 'The City of Comrades'; 'The Seven Torches of Character').
- King, Clarence** (1842-1901), geologist, born Newport, R.I.; surveyed Mt. Whitney and Yosemite Valley; conducted survey of 40th parallel across Rocky Mts.; first director U. S. Geological Survey 1879 ('Systematic Geology').
- King, Ernest Joseph** (born 1878), U. S. Navy officer, born Lorain, Ohio; submarine and aviation expert, chief of Bureau of Aeronautics 1933-36; commander in chief of Atlantic Fleet 1940-41; commander in chief of the U. S. Fleet 1941; chief of naval operations 1942-45; appointed fleet (5-star) admiral 1944; with W. M. Whitehill wrote 'Fleet Admiral King, a Naval Record': *picture* W-255
- King, Rufus** (1755-1827), statesman, born Scarboro, Me., then part of Massachusetts; member Constitutional Convention; signed United States Constitution for Massachusetts; U. S. senator 1789-96, and minister to England
presidential candidate M-364
- King, Thomas Starr** (1824-64), Unitarian clergyman, born New York City; popular lyceum lecturer; helped keep California in Union. See also in *Index* Statuary Hall (California), *table*
- King, Wayne** (born 1901), saxophonist and orchestra leader, born Savannah, Ill.; exponent of "sweet" popular music; called "waltz king."
- King, William** (1768-1852), statesman, born Scarboro, Me., then part of Massachusetts; first governor of Maine (1820-21); shipbuilder and owner, leading citizen of Bath; led 7-year struggle in legislature and meeting hall for separation of Maine from Massachusetts. See also in *Index* Statuary Hall (Maine), *table*
- King, William Lyon Mackenzie** (1874-1950), Canadian statesman and economist K-44-5, C-102, 103, C-90, *picture* K-44
- King, William Rufus** (1786-1853), statesman, born Sampson County, N.C.; House of Representatives 1810-16; U. S. Senate 1819-44
vice-president of U. S. See in *Index* Vice-presidents of the United States, *table*
- King**, a male sovereign of a nation, tribe, or territory; title usually hereditary and for life; comes from Anglo-Saxon *cyning* meaning "belonging to the tribe." In general, in modern times, the powers of the king have been greatly lessened by constitutional governments
origin of G-145
- King**, a mandarin orange O-400
- Kingbird**, also called bee martin K-45, F-190, *picture* F-190, color *picture* B-183
- King bird of paradise** P-75, color *picture* P-74
- King cobra**, or hamadryad, a large cobra-like snake C-373
- King College**, at Bristol, Tenn.; Presbyterian; opened 1867; arts and sciences.
- King crab**, also called spider, or Japanese, crab C-505, *picture* C-504. See also in *Index* Horseshoe crab
- Kingcup**, name given to marsh marigold in England M-103
- Kingdom**, in plant and animal classification B-152, L-225, *pictures* L-224d
- Kingfish**, family group of excellent food fish (*Menticirrhus*); dull in color; abundant in shallow water from Cape Ann, n.e. Massachusetts, southward; bottomfish without air bladder, lower fins enlarged. Name also applied to large Spanish mackerel (*Scomberomorus*) of West Indies.
- Kingfisher** (ancient name halcyon), a fish-eating bird K-45, P-75, *picture* K-45, color *pictures* P-74, B-183
female brightly colored B-177
- King George Sound**, at s.w. tip of Australia; British naval base.
- King George's War**, name given by English colonists to conflict in America between French and English 1744-48 (in Europe called War of Austrian Succession) K-46
- 'King Henry IV'**, one of best of Shakespeare's historical plays; in two parts; concerns life of Henry IV, but interest centers about Prince Hal, Henry's son, and Falstaff, great comic character
chronology and rank S-129
quoted H-336
- 'King Henry V'**, historical drama by Shakespeare; concerns gay Prince Hal, now wise King Henry V, up to time of his marriage with Katherine of France
chronology and rank S-129
- 'King Henry VI'**, historical drama in three divisions, most of which Shakespeare wrote or revised; relates life of Henry VI ending in his assassination
chronology and rank S-129
- 'King Henry VIII'**, historical drama by Shakespeare; concerns life of Henry with Queen Katherine and with Anne Boleyn, ending with christening of Elizabeth
chronology and rank S-129
quoted W-182
- King Island**, n.w. of Tasmania; 40 mi. long; pop. 954: *map* A-489
- King James Version of Bible** B-135, E-376b-7
literary value W-311
- 'King John'**, Shakespeare's earliest historical play, concerns John, infamous usurper of English throne, and his struggle to keep power from his nephew Arthur, rightful heir
chronology and rank S-129

'King Lear', tragedy by Shakespeare K-46
 chronology and rank S-129
 Kinglets, various tiny insect-eating birds K-46, *picture* K-46, *color picture* B-186
 "King-Maker, The." *See in Index*
 Warwick, Richard Neville, earl of
 Kingman Reef, U. S. naval base in Pacific, 1100 mi. s. of Honolulu; 1 sq. mi.; radio station.
 King of beasts, title usually given to the lion L-261, *pictures* L-260
 'King of the Golden River', story by John Ruskin R-255
 King penguin P-118, 120
 King Philip's War (1675-76), led by King Philip, chief of Wampanoag Indians. against New England colonists. K-46-7, 1-110a-b
 Springfield burned S-358
 King post. *See in Index* Architecture, *table* of terms
 King rail R-57, *picture* R-57
 'King Richard II', historical drama by Shakespeare in which King Richard's insincerity and partiality led to Bolingbroke's ascension to the throne (as Henry IV) and to Richard's murder
 chronology and rank S-129
 'King Richard III', historical tragedy by Shakespeare; plot woven about cynical, ruthless Richard, who perpetrates many deaths to gain desires; slain in battle: R-151
 chronology and rank S-129
 Kings, eleventh and twelfth books of the Old Testament, usually written I Kings and II Kings, dealing with the period that embraces the reigns of all the kings of Israel except Saul and David.
 King salmon, Chinook salmon, or tree salmon S-28, *color picture* F-118
 King's Bench (or Queen's Bench), Court of, in England C-500
 Kings Canyon National Park, in California N-36, *maps* C-35, N-18
 King's Chapel, Boston, Mass. B-260
 King's College, N.Y., now Columbia University N-222
 King's College, Toronto, Canada, now University of Toronto T-155
 King's College, University of, at Halifax, Nova Scotia, Canada: Anglican; founded 1789 at Windsor; royal charter 1802; moved to Halifax 1923; arts and sciences, journalism, theology.
 King's evil. *See in Index* Scrofula
 Kingsford, William (1819-98), Canadian engineer and historian. born England; surveyed Lachine Canal; helped build Hudson River Railroad and Panama Railroad, was Dominion engineer in charge of St. Lawrence River and the Great Lakes ('History of Canada' in 10 vols.).
 Kingsford-Smith, Sir Charles E. (1897-1935), Australian aviator; completed in 1930, at Oakland, Calif., world flight begun 1928; lost 1935 on England to Australia flight: *table* A-104
 King's Highway, or King's Way, historical road in U. S. R-161
 King's Highway, or Royal Road, in California. *See in Index* Camino Real
 Kingsley, Charles (1819-75), English clergyman and author K-47
 quoted on Shakespeare S-127
 sweatshop named by S-460
 Kingsley, Henry (1830-76), English novelist, brother of Charles Kingsley ('Ravenshoe'): A-493
 Kingsley, Mary Henrietta (1862-1900), English author, ethnologist, niece of Charles Kingsley; wrote books on travels and studies in w. Africa.

Kingsley, Sidney (born 1906), playwright, born New York City; 'Men in White', Pulitzer prize play (1934), about a city hospital; 'Dead End', pungent drama of a tough gang of New York City boys; 'The Patriots', about Thomas Jefferson and Alexander Hamilton, written with wife Madge (Evans) Kingsley (born 1909); 'Detective Story' pictures events in a police station.
 Kingsley Dam, in Nebraska, on North Platte River N-96, *map* N-102. *See also in Index* Dam, *table*
 Kings Mountain, 8-mile ridge extending from near Kings Mountain (city), North Carolina, into South Carolina; a spur of the ridge in South Carolina, where Americans defeated British October 1780, is part of national military park, established 1931: S-108, S-294, T-59, *maps* S-290, N-274
 King snake S-209, *picture* S-205
 Kings Park, N.Y., in Suffolk County, 40 mi. n.e. of New York City on Long Island; pop. 10,960; Sunken Meadow State Park nearby: *map*, *inset* N-204
 Kings Peak, Utah, in Uinta range of Rocky Mountains; highest point in state (13,498 ft.): *maps* U-416, 410
 Kings Point, N. Y., village on n.w. Long Island 8 mi. n. of Jamaica; pop. 2,445; United States Merchant Marine Academy. *See also in Index* United States Merchant Marine Academy
 Kingsport, Tenn., city on Holston River 88 mi. n.e. of Knoxville; pop. 19,571; chemicals, plastics, synthetic yarn, glass, book manufacturing, paper, textiles: *map* T-67
 King's Rangers. *See in Index* Rogers, Robert
 Kingston, Charles Cameron (1850-1908), Australian statesman; premier of South Australia 1893-99; helped to pass radical laws on woman suffrage, land, and labor.
 Kingston, Jamaica, on s. coast; capital, chief port, railroad center; pop. 109,056; British naval base; seaplane harbor: *maps* W-96, C-528
 U.S. naval and air base nearby J-290
 Kingston, N.Y., city on Hudson River, 55 mi. s. of Albany; pop. 28,817; trade in coal, stone, brick, lime, cement, lumber, and farm products; railroad shops, lace-curtain mills; founded by Dutch 1652; first state constitutional convention and temporary capital 1777; burned by British same year: *map* N-205
 Kingston, Ontario, Canada, at n.e. end of Lake Ontario, historic city commanding entrance to St. Lawrence River; pop. 33,459: K-47, *maps* C-69, 72
 Kingston, Pa., borough on Susquehanna River 2 mi. n. of Wilkes-Barre; pop. 21,096; coal, cigars, silk; railroad shops; site of stockade Forty Fort built in 1772: *map* P-133
 Kingston-upon-Hull, also Hull, seaport in n.e. England on Humber River; pop. 299,068; naval arsenal; fisheries: *map* B-325
 Kingstown, Ireland. *See in Index* Dun Laoghaire
 Kingsville, Tex., town 35 mi. s.w. of Corpus Christi; pop. 16,898; dairying center; headquarters of famous King Ranch (about 1,000,000 acres acquired by Richard King, a Rio Grande steamboat captain), first unit established in 1854; Texas College of Arts and Industries: *map* T-91
 Kingteheheu (*jǐng'dǔ'gǔn'*), town of s.e. China, in province of Kiangsi

on river Chang; pop. 86,744; porcelain center: *map* C-260
 King vulture V-524, *color picture* B-176
 King William Island, in District of Franklin, Northwest Territories, Canada, s.e. of Victoria Island; area 6200 sq. mi.: *maps* C-68, P-346
 Sir John Franklin perished P-350
 King William Land, or King Wilhelm Land, in n.e. Greenland, *map* N-250
 Amundsen at A-238
 King William's War (1689-97), colonial war in North America; part of great struggle against Louis XIV: K-47, W-139
 Captain Kidd, privateer K-38
 Frontenac F-301
 Schenectady massacre S-56
 Kinkaid, Thomas Cassin (born 1888), U.S. Navy officer, born Hanover, N. H.; important part in 1942 in battles of Coral Sea, Midway, Solomons, Guadalcanal; became commander of naval forces in North Pacific; commander of 7th Fleet in s.w. Pacific 1943-45; took command of w. sea frontier 1945, of e. sea frontier and Atlantic reserve fleet 1946; retired 1950.
 Kinkajou (*Cercopithecus caudivolvulus*), small mammal of the raccoon family; common in tropical regions of Americas; eats honey, eggs, small mammals; sometimes called a "honey bear"; often made a pet; fur used commercially.
 Kinley, David (1861-1944), American educator and economist, born Scotland; came to United States 1872; taught at Goucher College, Baltimore, and University of Wisconsin; at University of Illinois after 1893, president 1920-30, president emeritus after 1930.
 Kinnaird, Mary Jane (Mrs. Arthur F. Kinnaird) (1816-88), English philanthropist, one of founders of Y.W.C.A. Y-343
 Kinneret, or Chinnereth, Lake. *See in Index* Galilee, Sea of
 Kino (*kē'nō*), Eusebio (1645?-1711), Jesuit missionary, born Italy; founder of missions in American Southwest: S-308
 Devil's Highway in Organ Pipe Cactus National Monument N-38
 first to see Casa Grande ruins N-32
 Tumacacori National Monument N-38c, *map* N-18
 Kinsey, Alfred Charles (born 1894), zoologist, born Hoboken, N. J.; on faculty Indiana University 1920-, professor of zoology 1929-; directed studies on human sex behavior supported by Indiana University and by Rockefeller Foundation (through National Research Council) 1938-; with others, author of 'Sexual Behavior in the Human Male' and 'Sexual Behavior in the Human Female'.
 Kinston, N. C., city on Neuse River, 70 mi. s.e. of Raleigh; pop. 18,336; tobacco market, cotton, fertilizer, brick, concrete products, lumber, textile and yarn manufacturing; state school for feeble-minded; Dobbs Farm (state correctional institute for Negro women): *map* N-275
 Kinzie, John (1763-1828), American pioneer fur trader, born Quebec, Canada; first white settler of Chicago, Ill.: C-237
 Kioga, Lake, in East Africa in Uganda Protectorate, *maps* E-199, A-46
 Kiölen Mountains. *See in Index* Kjölén Mountains
 Kioto, Japan. *See in Index* Kyoto
 Ki'owa, Indian tribe, formerly ranging in Oklahoma, Colorado, and Texas; now chiefly on reservation

- in Oklahoma: map I-106f, picture I-95, table I-107
calendar, picture I-108b
Kipchaks (*kîp-chûks*'), branch of the Mongols known as the "golden horde" M-345
Kipling, John Lockwood (1837-1911), British artist and educator; father of Rudyard Kipling: K-48, 49, 50
Kipling, Rudyard (1865-1936), English writer, famous for stories of India K-48-51, E-381, picture K-48 books by and about K-51
dedication to history of Irish Guards, quoted K-50
elegy for Balesstier, quoted K-49, 51
journalist K-48, 49
'Just So' story of elephant, picture E-327
limerick quoted L-244
'Namgay Doola', quoted W-310b
New Zealand, quoted on N-227
Nobel prize winner (1907) K-50
St. Nicholas contributor L-275, K-49-50
verse, quoted R-88f
Kirnia, Alexander (born 1891), Ukrainian operatic bass; studied in Berlin, Germany; member, Metropolitan Opera Co., New York City, from 1939.
Klipped herring, a herring which has been split, salted, dried, and smoked.
Klip skins L-147
Kirby, Rollin (1875-1952), cartoonist, born Galva, Ill.; cartoonist on *New York Mail*, *New York Sun*; political cartoonist, *New York World* 1914-31, *New York World Telegram* 1931-39, *New York Post* 1939-42; did cartoons for *Look* and *New York Times Magazine*; won Pulitzer prize three times.
Kirby, William (1817-1906), Canadian novelist, born in England; edited *Niagara* (Ontario) *Mail* for 20 years; collector of customs, *Niagara* 1871-95 ('The Golden D'g'; 'U. E.', an epic poem; 'Canadian Idylls'): C-105
Kirby-Smith, Edmund. See in Index
Kirby-Smith, Edmund Kirby
Kirehshoff (*kîr-k'hôf*'), Gustav Robert (1824-87), German physicist; developed spectrum analysis and discovered cesium and rubidium (with Bunsen); explained the Fraunhofer lines
spectroscopic discoveries S-331, P-231, picture A-428
Kirghiz (*kîr-gêz'*), nomadic people of central Asia, of Turko-Tataric (Mongolian) race, ranging from borders of European Russia to w. China: A-414-15
in Afghanistan A-31
Kirghiz Soviet Socialist Republic, in central Asia; largely mountainous: area 76,062 sq. mi.; pop. 1,490,000; stock raising, coal mining; cap. Frunze (pop. 92,659): T-214, map R-260
children, picture R-273
Kirin (*kê-rin'*), province of e.-central Manchuria; area about 45,000 sq. mi.; pop. 7,000,000; cap. Kirin (Yungki); much larger than now, Kirin historically formed, with Heilungkiang and Liaoning, the Three Eastern Provinces of Greater China: M-72, 76
Kirin, or Yungki (*yung-gêz'*), city in Kirin, or Yungki, in Kirin province on Sungari River; pop. 246,873; trade center of large tobacco and timber areas; industries powered by Sungari hydroelectric plant: maps M-72, A-406
Kirk, Grayson (Louis) (born 1903), educator, born near Jeffersonville, Ohio; on faculty University of Wisconsin 1928-40; joined Columbia University 1940, professor of government since 1943, provost 1949-53, vice-president 1950-53, acting head during Dwight D. Eisenhower's leave of absence 1951-53, president 1953-
Kirkklareli (*kîrk-lâr-ê-lê'*), also Kirk-Klissa, vilayet and town in Turkey in Europe; pop. of vilayet 192,333, of town 14,464; scene of first important Bulgarian victory over Turks in Balkan War of 1912.
Kirkpatrick, Ralph (born 1911), harpsichordist, born Leominster, Mass.; studied with Nadia Boulanger and Wanda Landowska.
Kirk's Hall Abbey, at Leeds, England L-158
Kirksville, Mo., city 170 mi. n.w. of St. Louis; pop. 11,110; seat of Adair County; shoes, printing and publishing: Northeast Missouri State Teachers College: map M-318 College of Osteopathy O-426b
Kirkuk (*kîr-kûk'*), Iraq, town about 150 mi. n. of Baghdad and connected to it by railroad; oil center; pop. 69,035. Also name of province; pop. 285,878: map A-285
Kirkwa'i, capital of Orkney Islands, important British base during World War I; pop. 4348; fine Norman-Gothic cathedral begun in 1138: O-425, map B-324
Kirkwood, Samuel Jordan (1813-94), political leader, born Harford County, Md.; Civil War governor of Iowa; U.S. senator; secretary of interior under President Garfield. See also in Index Statuary Hall (Iowa), table
Kirkwood, Mo., suburb of St. Louis; pop. 18,640; chiefly residential: map, inset M-319
Kirman, Iran. See in Index Kerman
Kirstein (*kâr-stên*), Lincoln (Edward) (born 1907), ballet promoter and writer, born Rochester, N. Y.; a founder of School of American Ballet, New York City, director after 1940; general director New York City Ballet after 1948; managing director New York City Center of Music and Drama 1952-55
Ballet Caravan D-141
Kirsten, Dorothy (born 1917), concert and operatic soprano, born Montclair, N.J.; studied in New York City and in Rome, Italy; U.S. debut 1940; member of Metropolitan Opera Co., New York City, from 1945.
Kirava, Sweden, mining town n. of Arctic Circle S-462, map N-301, picture S-464
Kish, ancient city in lower Mesopotamia (Iraq), near the Euphrates River, 8 mi. e. of Babylon K-51, maps A-285, B-138, B-6, picture K-51
excavations K-51, picture K-51
Kishlner (*kê-shê-nyôf'*), Rumanian Chisinau (*kê-shê-nâ'u*), Russia, city in Bessarabia (Moldavian S.S.R.), 85 mi. n.w. of Odessa: pop. 110,000; agricultural center; ceded by Russia to Rumania after World War I; returned to Russia 1940; terrible pogroms (1903, 1905): maps R-267, E-417
Kishon (*kî-shôn*), small river of Palestine; enters Mediterranean near Haifa: P-44
Kiskadden, Maude. See in Index Adams, Maude
Kiska Island, largest of Rat Islands in Aleutians, map A-135
World War II W-261, 263
Kismayu. See in Index Chismalo
Kiss (*kês*), August (1802-65), German sculptor; well known for studies of animals ('Mounted Amazon Attacked by a Tiger').
Kissimmee River, Florida, rises in lake of same name; flows s.e. 90 mi. to Lake Okeechobee: map F-159
Kissingen (*kis'ing-ên*), Germany, famous spa in Bavaria, 60 mi. e. of Frankfurt-on-the-Main; salt springs known from 9th century.
Kisu'mu, Kenya Colony, a terminus of the Uganda Railway; on Lake Victoria; pop. 10,899; the harbor portion is called Port Florence: maps A-46, E-199
Kital Gorod (Chinese city), part of Moscow M-398
Kit Carson. See in Index Carson, Christopher
Kit-Cat Club, famous 18th-century club in London including among members Addison, Steele, and other prominent writers and political leaders, all Whigs; named for tavern of Christopher Cat where meetings were held.
Kitchen
changes in, picture S-144d
colonial, pictures A-193a, 207
equipment B-346a, C-466, pictures C-465, L-239, S-144d
"Kitchen Cabinet," popular name applied to group of men who (although they held no important offices) influenced President Jackson J-287
Kitchener, formerly Berlin, Ontario, Canada, manufacturing city 60 mi. s.w. of Toronto; pop. 44,867; beet-sugar refinery; furniture, clothing: maps C-72, inset C-68
Kitchener of Khartum, Horatio Herbert Kitchener, first Earl (1850-1916), British general K-52, B-220, S-442a
Kitchener wheat, picture W-116
Kitchen middens, refuse heaps of prehistoric settlements containing bones, shells, debris, and relics of industry and art; valuable to archaeologists in study of life of early peoples: M-66
Kite K-52-4, pictures K-52-4
airplane compared with, experiments A-101
box K-54: making, picture K-52
China and Japan, kite flying K-53, C-268-9
former use by Weather Bureau K-52
how to make and fly K-52, 54, pictures K-52-4
military use K-53
safety in flying S-8
Kite, a bird of prey K-52, H-293, picture H-292
Kite's Day, holiday in China K-53, C-268-9
Kittat, British Columbia, Canada; village at head of inlet of the Pacific, 40 mi. s.w. of Terrace; pop. 450
aluminum smelter C-88
Kitksan (*kî-k'sân'*), a Chimmesyan Indian tribe living on upper Skeena River, British Columbia, Canada.
Kitson, Henry Hudson (1865-1947), American sculptor, born Huddersfield, England; his many public monuments include 'Minute Man at Lexington'.
Kittatinny Mountains, range of the Appalachians, in New York known as Shawangunk, in New Jersey as Kittatinny, in Pennsylvania generally as Blue but also as Kittatinny and North Mts.
Delaware Water Gap D-60
New Jersey N-155, maps N-156, 164
Pennsylvania, maps P-122, 133
Kitten ball B-72
Kittiwake, a gull (*Rissa tridaactyla*) which breeds in the Arctic regions and winters as far south as the Atlantic and Pacific coasts of the

- United States; it is about 18 inches long and has white plumage with a pale bluish-gray mantle; hind toe is entirely absent or rudimentary; named from its cry: G-231
- Kittredge, George Lyman** (1860-1941), educator and philologist, born Boston, Mass.; graduated at Harvard University and taught English there 1888-1936, became professor 1894; author of standard works on English grammar and philology.
- Kittson, Norman Wolfred** (1814-88), Canadian fur trader, born Chambly, Lower Canada; 1830 joined American Fur Company; 1844-54 maintained a trading post at Pembina on Red River and did much to break monopoly of Hudson's Bay Company.
- Kittul**, also kittool, a wood fiber B-330
- Kitty Hawk, N. C.**, village in n.e. on strip of land between Albemarle Sound and Atlantic Ocean where the Wright brothers practiced gliding and made their first successful flight; pop. 300: W-309, A-102, map N-275, picture A-103
- Kill Devil Hill National Memorial** N-38d, picture N-268
- Kilusbu, Japan.** See in *Index* Kyushu
- Kiva** (*ké'va*), ceremonial room of Indians in s.w. U.S. A-357, I-104d
- Kivu, Lake, in e.-central Africa** on e. border Belgian Congo; 60 miles long: maps B-109, A-46, E-199
- Kiwanis clubs** organizations of business, professional, and agricultural men for the rendering of civic and social service to their communities. The first Kiwanis club was formed in Detroit in 1915, and Kiwanis International was organized in 1917. Each club is made up of two members of each business or profession in the community. The motto of Kiwanis is "We build."
- Kiwī** (*ké'wē*), or apteryx (*āp'tēr-iks*), primitive bird, related to ostrich; has coarse hairlike feathers, short neck and legs, a long bill with nostrils at the tip; swift runner: N-228 foot, picture B-175
- Kiyonaga** (1742-1815), Japanese color-print artist; figures, scenes: J-317
- Kizilirmak** (*kiz-il-ir-māk'*) (ancient Halys (*hāl'is*), river in Asia Minor, rises near border of Armenia; flows n. and w. into Black Sea; 600 mi. long: maps T-215, B-204, P-156
- Kizil Kum, a desert in Russia, e. of Caspian Sea** R-261, maps A-412, D-73a
- Kjelgaard, James Arthur** (born 1910), author of children's books, born New York City; of Danish parentage; American history and the outdoors ('Big Red'), 'Snow Dog'; 'Explorations of Père Marquette'; 'The Coming of the Mormons').
- Kjerulf** (*chē-rūlf'*), Halvdan (1815-68), Norwegian composer, famous for his songs ('Last Night'); also wrote piano compositions; influenced Norwegian national music.
- Kjulen Mountains, or Kiolen Mountains** (*chū'lēn*), formerly Keel, between Sweden and Norway N-300, maps N-301, E-419
- Klabund** (*klā-bunt'*), pen name of Alfred Henschke (1891-1928), German author of lyrics, novels, dramas; in his short life made important contribution to German literature; among his plays are 'Kirchblütenfest' with Japanese setting and Chinese play 'Kreidekreis'; novels, mainly on historical subjects, include 'Mohammed', 'Pjotr', and 'Borgia'.
- Klagenfurt** (*klā'gēn-furt*), important manufacturing city in s. Austria; pop. 62,782; chief city of Klagenfurt region (800 sq. mi.), voted to remain in Austria after World War I: map E-425
- Klaipeda, also Klaypeda** (*klī'pē-dā*), Lithuanian name of Memel.
- Klamath** (*klām'āth*) Falls, Ore., city at s. tip of Upper Klamath Lake, about 15 mi. n. of California line; pop. 15,875; railroad and tourist center in lumbering, farming (barley, potatoes), and livestock-raising area: lumber products, sawmill machinery, farm machinery, plastics: maps O-416-17, U-252
- Klamath Indians, a tribe** occupying Klamath Indian Reservation (1360 sq. mi.) in s. Oregon.
- Klamath River, 180 mi. long** rising in Upper Klamath Lake in s. Oregon and flowing through n. California into Pacific, maps C-34, O-416
- Klamathweed.** See in *Index* St.-John's-wort
- Klaproth** (*klāp'rōt*), Martin Heinrich (1743-1817), German chemist and mineralogist; his research led to discovery of uranium and zirconium: U-405
- Klar River, short stream** in s. of Scandinavian peninsula; flows into Lake Vänern: maps N-301, E-424
- Klaus, Karl Karlovich** (1796-1864), Russian chemist and biologist, discoverer of ruthenium; investigated flora and fauna of Volga steppes.
- Klausenburg, Rumania.** See in *Index* Cluj
- Kléber** (*klā-bēr'*), Jean Baptiste (1753-1800), French Revolutionary general; assassinated while subjugating Egypt.
- Klebs** (*klāps*), Edwin (1834-1913), pathologist, born Königsberg, Germany; professor at Bern, Würzburg, Prague, Zurich, and Rush Medical College, Chicago; known for work in pathology of infectious diseases; discovered diphtheria bacillus 1883.
- Klee** (*klā*), Paul (1879-1940), Swiss surrealist painter; a leader in Dadaistic movement; work suggestive of primitive art or child art 'Intention' P-23b, color picture P-23b 'Old Man Figuring' D-140c-d, picture D-140c
- Kleiber** (*klī'bēr*), Erich (born 1890), Austrian orchestra conductor, born Vienna; general director Berlin Staatsoper; guest conductor New York Philharmonic Orchestra.
- Klein, Abraham** (Moses) (born 1909), Canadian poet, born Montreal, Quebec, Canada, of Jewish parents ('Hath Not a Jew'; 'The Hitleriad'; 'Poems'): C-106a
- Kleist** (*klīst*), Heinrich von (1777-1811), German romantic dramatist and poet, now given high rank, but not recognized during his life; committed suicide ('Penthesilea', tragedy; 'The Broken Pitcher', comedy; 'Michael Kohlhaas', story of time of Luther).
- Klementans, a group of tribes** in Borneo, whose members are generally intelligent and well built.
- Klerk, Michel de** (1884-1923), Dutch architect, identified with modern movement in the Netherlands; obtained decorative effects with brick and tile; especially noted for municipal buildings and a housing project in Amsterdam.
- Kleve** (*klā'vā*), Germany, also Cleves, town in n.w. near frontier of Holland; formerly capital of duchy of Cleves; castle associated with the legend 'Knights of the Swan', immortalized in Wagner's 'Lohengrin'.
- Klikitat** (*klīk'i-tāt*), a Sahaptan tribe of Indians in state of Washington.
- Klinger** (*klīng'ēr*), Friedrich Maximilian von (1752-1831), German dramatist, born at Frankfurt-on-the-Main, Germany; important figure of the 'Storm and Stress' (*Sturm und Drang*) period of German romanticism which was named from his drama of that title; other works: 'Die Zwillinge' (The Twins) and 'Fausts Leben, Thaten und Höllenfahrt' (Faust's Life, Deeds, and Journey to Hell).
- Klinger, Max** (1857-1920), German painter, sculptor, and etcher. His works are highly personal, subjective, morbidly imaginative, and in defiance of conventional forms. The sculptures 'Salome' and 'Cassandra' are typical. One of his most renowned works is statue of Beethoven, in marble, ivory, gold, platinum, and bronze: S-80
- Klipfish.** See in *Index* Clipfish
- Klipspringer, or "African chamels,"** picture A-262
- Klondike, a gold-mining district** in Yukon Territory, Canada K-55, Y-348
- Klondike River, Yukon Territory, Canada** K-55
- Klopstock** (*klōp'shtōk*), Friedrich Gottlieb (1724-1803), German epic, lyric, and dramatic poet; deeply religious and patriotic; sought to restore ancient German spirit; had great influence in his own time and is still venerated for his lofty seriousness, though little read today ('The Messiah'; 'Religious Songs'; 'Odes').
- Knack, Alexander von** (1846-1934), Prussian general and field marshal first battle of Marne W-220, M-98
- Klystron, a vacuum tube** E-321
- Klyucherskaya** (*klly-chēf'ska-ya*), or Klucher, active volcano in Kamchatka, Siberia; 16,130 ft.: K-1, map R-259
- Knapweed** (*nāp'wēd*), a perennial plant (*Centaurea nigra*) of composite family, native to Europe but now common to North America. Grows to 2 ft.; leaves lance-shaped, to 6 in. long. Small flowers rose-purple. Also called hardheads.
- Knee Jerk, a simple reflex** R-90
- Kneipp** (*knīp*), Sebastian (1821-97), German priest known for special water cure, which included walking barefooted in wet grass and on snow ('My Water Cure').
- Kneisel** (*knī'zēl*), Franz (1865-1926), violinist and musical conductor, born Bucharest, Rumania, of German parents; founder and first violinist of Kneisel Quartet.
- Kneller** (*nēl'ēr*), Sir Godfrey (1646-1723), court painter to Charles II and succeeding English sovereigns to time of George I; born Germany.
- Knes'set, Israeli parliament** I-257
- Knibbs, Henry (or Harry) Herbert** (1874-1945), writer of verse and western novels, born of American parents at Clifton (now Niagara Falls), Ontario, Canada; spent most of life in U. S. ('Saddle Songs and Other Verse'; 'The Ridin' Kid from Powder River', novel).
- Knickerbocker, Dietrich**, pretended author of Washington Irving's burlesque history of New York City. The Knickerbockers were an old Dutch family; name now applied to descendants of the original Dutch settlers of New York, more widely to any New Yorker: A-226b

Knickerbocker, style of short breeches A-200, *picture* A-200
 Knickerbocker Baseball Club of New York (1845) B-71
 Knife, as tool T-150, 153, *pictograph* T-151

Stone Age, *picture* S-401
 use in camping C-59

Knife and fork K-59. *See also in Index* Cutlery

Knife edge, in weighing machines W-85

Knight, Charles Robert (1874-1953), painter, illustrator, sculptor, and muralist, born Brooklyn, N.Y.; favorite subjects animals and birds, prehistoric men and animals

paintings, *pictures* M-64, 65, S-1
 Knight, Eric Mowbray (1897-1943), author, born Yorkshire, England; to U.S. 1912; in British Army in World War I; major in U.S. Army, World War II; killed in airplane crash. Books—for children: 'Lassie Come-Home'; adult novels: 'This Above All' and 'Sam Small Flies Again'.

Knight, Laura, Dame (born 1877?), English painter, chiefly of life of the stage and circus; wife of Harold Knight (born 1874), a portrait painter; made dame commander of the Order of the British Empire 1929.

Knighthood K-55-7, *pictures* K-55-6
 armor A-377, *picture* A-376

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 Froissart's 'Chronicles' F-301
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King Arthur and his Round Table A-393-4, R-236: Sir Galahad G-1-3, *picture* G-2

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Knights Hospitalers of St. John (crusading order) C-522-3

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Malta, Knights of M-60, C-523:

shield F-136c, *color picture* F-132

Rhodes, Knights of R-144: banner

F-136c, *color picture* F-132

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Knights of Columbus, Roman Catholic

fraternal organization K-57

Knights of Labor, U.S. L-70d

Labor Day L-75

Knights of Malta, crusading order,

originally Knights Hospitalers of

St. John M-60, C-523

shield F-136c, *color picture* F-132

Knights of Pythias D-13

Knights of Rhodes R-144

banner F-136c, *color picture* F-132

Knights of St. Gregory, order of

Knighthood under patronage of St.

Gregory I, founded 1831 by Pope

Gregory XVI, originally to reward

service of citizens of church states;

now granted to members of any

fath or country whose services

benefit the Vatican and religion.

Knights of St. John, or Hospitalers.

See in Index Knights Hospitalers of

St. John

Knights of the Golden Circle C-337

Knights of the Round Table R-236,

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'Idylls of the King' T-73

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Launcelot G-1, *picture* L-216c

Knights of the White Camellia, secret

society in South during reconstruction

period R-86

Knight's tale, in Chaucer's 'Canterbury

Tales' C-203

Knights Templar, a Masonic order;

based on traditions of crusading

order; open only to Masons who

have taken Royal Arch degree: F-283

Knights Templars (crusading order)

C-522, 520

bankers B-51

Temple in London L-300

Kniphofia (*nip-hô-fi-a*), a genus of perennial plants of the lily family, native to Africa. Root is a bulb; leaves long, grasslike; flowers small, tubular, densely clustered at top of smooth, tall stem, shading from yellow to orange, or coral, rarely white; also called tritoma, red-hot-poker plant, torch lily, or flame flower.

Knitted goods K-57-9, F-7-8

Knitting machines K-57-9, *pictures*

K-58

Knobs, area in Kentucky K-23

Knobstone Escarpment, in Indiana

I-71

Knockout, in boxing B-267

"Knockout drops." *See in Index*

Chloral hydrate

Knolls Atomic Power Laboratory,

table A-470

Knossus, Crete. *See in Index*

Knossus

Knot, a nautical unit for measuring

the speed of a ship, also of an air-

plane L-294, *table* W-87

Knot, shore bird of family Scolopacidae; the American knot (*Calidris canutus*) is about 10½ inches long; ranges from Arctic regions of North America to Patagonia in South America; breast is reddish in summer, but barred with black in winter; another species, the eastern Asiatic knot (*Calidris tenuirostris*), ranges from Siberia, China, and Japan to Australia and India: S-209

Knootroot. *See in Index* Stachys

Knots, hitches, and splices K-59-63,

pictures K-60-3

fishermen's knots, *picture* F-118e

square knot in sewing, *diagram* S-112

used in rugmaking R-248

Knotty pine. *See in Index* Lodgepole

pine

Knottweed, jointweed, or smartweed, common trailing weeds comprising the genus *Polygonum* of the buckwheat family; jointed stems, long grasslike leaves, and small white, rose, or green flowers.

Know-how, in American industry

I-137

Knowland, William F(ife) (born

1908), political leader and publisher,

born Alameda, Calif.; assistant

publisher of *Oakland Tribune* after

1933; in California state assembly

1933-35, senate 1935-39; member

Republican National Committee

1938-42, chairman of executive

committee 1940-42; in World War

II 1942-45; U. S. senator after 1945,

majority leader 1953-55.

Knowles, Lucius James (1819-84),

inventor, born Worcester, Mass.;

devised a safety steam boiler feed

regulator, several models of steam

engines, and many loom improve-

ments.

Know Nothing party. *See in Index*

American party

"Know then thyself, presume not God

to scan" (Alexander Pope) P-369

"Know thyself," the motto of Socrates.

Knox, Henry (1750-1806), Revolu-

tionary War general, born Bos-

ton, Mass., commander of artillery

forces; trusted adviser of Washing-

ton, and directed many successful

operations for him; started military

school which later became West

Point; secretary of war (1785-94),

first under Continental Congress,

later under Washington as first

president: *picture* C-3

Knox, John (1513?-72), Scottish

Protestant leader K-63, S-65

Edinburgh church E-234

"Knoxian" Puritans P-443

Knox, John Jay (1828-92), financier, born Augusta, N.Y.; author of Coinage Act of 1873 which dropped silver dollar from coinage; had been comptroller of the treasury and president National Bank of the Republic.

Knox, Philander Chase (1853-1921), lawyer and statesman, born Brownsville, Pa.; United States attorney general 1901-4 under McKinley and Theodore Roosevelt; secretary of state 1909-13 under Taft; senator from Pennsylvania after 1913

Roosevelt and the trusts R-223

Knox, Rose Bell (born 1879), author of children's books; born Alabama; authentic stories of life in the South ('Boys and Sally down on a Plantation'; 'Footlights Afloat').

Knox, (William) Franklin (1874-1944), newspaperman and political leader, born Boston, Mass.; editor and publisher of the *Chicago Daily News* after 1931; Republican nominee for vice-president of U.S., 1936; appointed secretary of the navy in F. D. Roosevelt's Cabinet 1940.

Knox College, at Galesburg, Ill.;

founded 1837; arts and sciences,

Knoxville, Tenn., city in e. on Ten-

nessee River; pop. 124,769: K-63-4,

T-56, *maps* T-67, U-253, *picture*

K-63

University of Tennessee, *picture* T-60

Knoxville College, at Knoxville, Tenn.;

controlled by United Presbyterian

church; founded 1863 as McKee

School in Nashville, Tenn.; arts and

sciences, education.

Knobel, Frederik Hermann (1870-1945), clergyman, born New York City; founder and pastor, Church of Atonement, New York City; president United Lutheran Church in America.

Knudsen, William S(ignius) (1879-1948), American industrial executive, born Denmark; president General Motors 1937-40; member National Defense Advisory Commission 1940; director Office of Production Management 1941-45; in charge of production for War Department 1942-44, also 1945; head of Air Forces Matériel and Services Command July 1944-April 1945; retired from War Dept. May 1945; returned to General Motors board.

Knurl, a tool T-150

Knut (*knpt*), Cnut, or Canute (994-1035), king of Danes and Norwegians, ruler of England 1016-35 C-117

Koa (*kô'û*), a tree (*Acacia koa*) found in Hawaii; timber valuable for building and cabinetwork; bark used in tanning.

Koala (*kô-û'la*), a tree-dwelling Australian marsupial about 2 ft. long A-480, K-2, *picture* A-480

export forbidden Z-359

Kobe (*kô'bê*), or Hiogo-Kobe, Japan, seaport in s. of island of Honshu, 20 mi. w. of Osaka; twin port with Osaka; pop. 765,435; silk trade; shipbuilding, metal and rubber manufactures; half destroyed in World War II: O-426, *maps* J-297, A-406

street scene, *picture* J-302

Köbenhavn, Danish name of Copen-

hagen. *See in Index* Copenhagen

Koberger, or Koburger, Anton (1440?-1513), German printer-publisher; introduced printing in Nuremberg; established agencies in all parts of Europe to sell books; developed a style of book binding

which is still associated with name: T-229-30

books printed by others B-248

Koblenz, Germany. *See in Index* Coblenz

Ko'bold, or gnome, in German folklore, a teasing mischievous elf F-11

cobalt named for C-372

Koburg, Germany. *See in Index* Coburg

Kocaba River, Poland. *See in Index* Katsbach River

Kocnell, Turkey. *See in Index* Nicomedia

Koch (kōk), Johan Peter (1870-1928), Danish Arctic explorer; 1912-13 led expedition over inland ice of Greenland.

Koch, Karl (1809-79), German botanist and traveler; professor of botany University of Jena; made scientific researches in Russia, also in the Orient.

Koch, Laue (born 1892), Danish geologist, explorer of Greenland.

Koch, Robert (1843-1910), German physician and bacteriologist K-64

disease germs isolated by D-103-4

Kochanowski (kō-kān-ōf'skē), Jan (1530-84), Polish humanistic poet; wrote in Latin and Polish; contributed greatly to development of his native language; fine translation of Psalms in verse.

Kocher (kōk'ēr), Emil Theodor (1841-1917), Swiss surgeon, noted for work on thyroid gland; first to operate successfully for exophthalmic goiter; 1909 Nobel prize winner in medicine and physiology.

Kochia (kō'ki-q), an annual plant of the goosefoot family, native to Eurasia. Grows 1 to 5 ft. high, forming an oval or pyramidal plant of bright green which turns, in one variety, to brilliant scarlet in autumn; leaves and flowers tiny. Also called burning bush, bevel-dere, and summer cypress but not to be confused with the true burning bush, a spindle tree. *See also in Index* Spindle tree

Kodak, trade-mark name for a camera P-226

Kodaly (kō-dā'yē), Zoltan (born 1882), Hungarian composer; professor theory and composition at Budapest Academy of Music after 1907; intense interest in Hungarian and Slovak folk songs; own works, modern and original, often contain folk-song material; symphonies, chamber, and piano music.

Kodiak (kō'di-āk) bear B-88

Kodiak Island, or Kodiak Island, off coast of Alaska, s. of Cook Inlet; 100 mi. long and 50 mi. wide; salmon fisheries; growing agricultural and grazing industries; U. S. naval base; chief town Kodiak (pop. 1710); *mops* A-135, N-250

Russian outpost in 1784 A-137

Kodok (kō'dōk), formerly Fashoda (fa-shō'da), town in former Anglo-Egyptian Sudan, on the White Nile; occupation by French 1898 (the Fashoda Incident) caused an Anglo-French crisis; under an agreement (March 21, 1899) France surrendered Sudan claims to Great Britain; *map* A-46

Koehl (kāl), Hermann (1888-1938), German aviator, *fohic* A-104

Koenig (kū'nik), Frederick (1774-1833), German inventor P-414d

Koenigswald, G.H.R. von (born 1902), German paleontologist; worked at American Museum of Natural History 1946; M-70

Koerber, Lella. *See in Index* Dressler, Marie

Koestler (kōst'lēr), Arthur (born

1905), British writer and foreign correspondent, born Budapest, Hungary; became British citizen 1948 (novels: 'Darkness at Noon', 'The Age of Longing'; history: 'Promise and Fulfillment, Palestine 1917-1949'; autobiography: 'Arrow in the Blue').

Koetaradja, also Kutaradja, city with seaport (Oeleelheue, or Ule-Lue) on n.w. tip of Sumatra; pop. 10,724; S-449, *maps* A-407, E-202

Koga, Mneichi (1885-1944), Japanese admiral; succeeded Yamomoto as commander in chief of navy 1943; had important role in seizure of Hong Kong and the Philippines; killed in airplane crash.

Kohinoor (kō-i-nō'), a famous diamond D-80, *picture* D-79

Köhler (kū'ler), Wolfgang (born 1887), German psychologist, chief exponent of Gestalt School, and investigator into animal behavior P-426, 427, E-247

Kohlrabi (kōl'rā-bi), vegetable of the cabbage type C-1, *picture* C-2

when and how to plant, *table* G-19

Koiso, Kuniaki (1880-1950), Japanese statesman and general; in July 1944 succeeded Tojo as premier of Japan, resigned April 1945; formerly governor of Korea; convicted as war criminal Nov. 1948, sentenced to life imprisonment.

Kokand (kō-kānt'), Russia, trade center in Uzbekistan 350 mi. e. of Bokhara; pop. 75,000; *map* A-406

Ko'komo, Ind., manufacturing city on Wildcat River, 50 mi. n. of Indianapolis; pop. 38,672; iron, steel, and brass products, stoves, automobile accessories, glass; *maps* I-78, U-253

Koko Nor, lake in n.e. Chinghai province, China, w. of Sling A-413, *maps* C-259, A-406

Kokopo, Territory of New Guinea, town on New Britain Island, *map* P-16

Kokoschka (kō-kōsh'kā), Oskar (born 1886), Austrian painter, identified with German expressionists; portraits, landscapes.

Kok-saghyz, Russian dandelion, source of rubber R-276

Koksoak River, in n.e. Quebec, Canada; flows into Ungava Bay; *maps* C-69, 73

Kola nut. *See in Index* Cola nut

Kola Peninsula, a mountainous peninsula of Russia between the Arctic Ocean and the White Sea; 50,000 sq. mi.; n. coast (Muran Coast) has several ice-free ports; *map* R-266

apartite R-277

Kolbe (kōl'bē), Adolf Wilhelm Hermann (1818-84), German chemist, born Elliehausen near Göttingen; noted for his theory of radicals; often regarded as discoverer of method for making salicylic acid by combining carbolic and carbonic acids.

Kolbe, Georg (1877-1947), German sculptor; best known for small bronze figures, simple and severe in design, suggestive of ideal Greek sculpture.

Kolchak (kōl-chāk'), Aleksandr Vasilevich (1874-1920), admiral in Imperial Russian navy; established Omsk government 1918; organized Siberian anti-Bolshevik army; executed by Bolsheviks 1920; W-240, 241, R-289

Kolin (kō'lēn), Czechoslovakia, Bohemian town on Elbe River, 30 mi. e. of Prague; pop. 19,280; Austrians defeated Frederick II of Prussia (1757), securing evacuation of Bohemia.

Kolin'sky, name given to the fur of a

weasel found in Siberia, China, and Korea; used in furriery; hair short, color dark brown.

Koller, Karl (1837-1944), Austrian ophthalmologist; in New York City after 1888

cocaine as anesthetic A-246

Kölln (kūln), medieval German city, now a part of Berlin B-126

Kollwitz, Käthe (1867-1945), German artist; a socialist, whose husband practiced medicine in Berlin slums. she was noted for realistic portrayal of suffering; first woman member Prussian Academy.

Köln, Germany. *See in Index* Cologne

Kol Nidre (kōl nīd'rā), song of the Jewish religious ritual, sung at evening service on the Day of Atonement (Yom Kippur); written in Aramaic; opening words, Kol Nidre, mean "All vows."

Kol'okol, Czar, bell B-121

Kolozsvár, Rumania. *See in Index* Cluj

Koltsov (kōlt-sōf'), Alexis Vasilevich (1809-42), Russian lyric poet, called the "Russian Burns"; author of numerous songs and ballads.

Komandorskie Islands, Russia. *See in Index* Commander Islands

Komaruo (kō'mār-nō), also Komarom or Komorn, Czechoslovakia, town on Danube River 50 mi. s.e. of Bratislava; pop. 17,465; surrendered to Austrians (1849) after brilliant defense in Hungarian revolution; grain, wine, fish, timber; *map* E-425

Komatik, Eskimo dog sledge E-394

Komensky, Johann Amos. *See in Index* Comenius, Johann Amos

Koml, Russia, autonomous republic within R.S.F.S.R. in n.e. European Russia; 144,750 sq. mi.; inhabited by Komis, or Zirlans (a Finnish people), Samoyeds, Russians; timber, grain, reindeer, fur, fish; *map* R-260

Kommander Islands, Russia. *See in Index* Commander Islands

Komodo (kō-mō'dō), island in Indonesia e. of Soembawa (or Sumbawa) and w. of Flores; area about 184 sq. mi.

dragon, or giant, lizard L-284, *picture* L-282; discovery E-456

Komondor (kō'mōn-dōr), a working dog native to sheep and cattle regions of Hungary; *table* D-118b

Kom'roff, Mannel (born 1890), novelist, born New York City; 'Coronet' traces decline of aristocracy from 17th century to modern times; other works include: 'The Grace of Lambs', short stories; 'Juggler's Kiss' and 'The Magic Bow', novels.

Komsonols, or Young Communists R-274, 281-2

Komsomolsk, city in e. Siberia on Amur River; coal, iron, steel; pop. 150,000; R-280, *map* A-406

Kona (kō'na), Hawaiian Islands, district on island of Hawaii H-288

Kondouriotis, or Condouriotis (kōn-dōr-i-ō'tis), Paul (1855-1935), first president of Greek Republic (1924-29); commander Greek fleet, Balkan War, 1912-13.

Kondylls (kōn-dē'lis), George (1879-1936), Greek general and political leader; overthrew Pangalos government by coup d'état, 1926, but resigned in same year.

Ko'nel, an alloy A-174

Königgrätz (kū-nik-grät's), Czech Hradec Králové (hrá'děts krá'lō-vā), city of Czechoslovakia, 65 mi. e. of Prague; pop. 52,292; 13th-century cathedral; Sadova, or Königgrätz, battlefield (1866) in

Koy; cápe, át, fär, fōst, whät, fäll; mé, yét, fērn, thére, íce, bít; rōw, wón, fōr, nót, dq; cáre, büt, ryde, füll, bárn; out;

Austro-Prussian War, nearby: *map* E-425
results of battle G-97

Königsberg, Russia. *See in Index*
Kaliningrad

Königshütte, Silesia. *See in Index*
Krolewska Huta

Konoye (*kō-nō-yō*), Fumimaro, Prince (1891-1945), Japanese statesman; as premier of Japan 1937-38 and 1940-41, largely responsible for nation's fascist policies; committed suicide.

Konstanz (*kōn'shtānts*), or Con'stance, Germany, city on Lake Constance at efflux of Rhine; pop. 42,934; one of oldest towns in Germany: *map* E-425

Council of Constance H-452

Kon'ti, Isidore (1862-1938), American sculptor, born Vienna, Austria; monumental decorative work for Chicago World's Fair (1893) and various other expositions.

Konya (*kōn-yā*'), Turkey, city in Asia Minor about 150 mi. s. of Ankara; pop. 64,509; ancient Iconium (*i-kō-ni-ūm*); became Seljuk capital 1097; taken by Frederick Barbarossa 1190; annexed to Turkey in 15th century; orchards famous since Middle Ages; carpets, textiles: *maps* T-215, A-406, P-156

Koodoo. *See in Index* Kudu

Kookaburra (*kūk'a-būr-a*), an Australian bird A-480

Koort (*kōrt*), Jan (born 1883), Estonian sculptor in granite, marble, and wood; works include sculptures in memory of the dead in Estonian War of Independence.

Koos, Leonard Vincent (born 1881), educator, born Chicago, Ill.; professor of secondary education, University of Minnesota 1919-29; University of Chicago 1929-46; director of research, American Association of Junior Colleges, 1946-('The Junior High School'; 'The Junior College').

Kootenay Indians, or Kutenai Indians, two tribes of the Kitunahan stock, one living in Montana, the other in British Columbia, Canada.

Kootenay Lake, in Rocky Mts., s.e. British Columbia, Canada; 221 sq. mi.: R-174, *maps* C-68, 80

Kootenay National Scenic and Recreational Park, in British Columbia, Canada N-38f, *maps* N-38f, C-80

Kootenay River (in U. S. known as Kootenai), tributary of Columbia River; 400 mi. long, rises in Canadian Rockies, British Columbia, Canada, flows s. into Montana and Idaho and back into British Columbia: *maps* C-80, I-20

Ko'pek, Russian minor coin; a hundredth part of a ruble.

Koran', sacred book of Mohammedans K-64

children learning, *picture* M-329

influence on Arabic language A-289

Korçe, Albania. *See in Index* Koritsa

Korcula (*kōr'chq-lā*), or Curzola (*kpr't-sō-lā*), island of Yugoslavia in Adriatic off coast of Dalmatia; 107 sq. mi.; boatbuilding, fishing: *maps* B-23, I-262

Kordofan (*kōr-dō-fān*'), province in former Anglo-Egyptian Sudan, Africa; 146,930 sq. mi.; pop. 1,640,039; cap. El Obeld; gum arabic. Nuba tribesmen, *picture* A-53

Kor'e, or Chosen, peninsula of e. Asia between the Sea of Japan and the Yellow Sea; divided into North Korea (area 47,978 sq. mi.; pop. 9,102,000; cap. Pyongyang) and South Korea (area 36,760; pop. 20,188,041; cap. Seoul): K-64a-7, *maps* J-297, A-406, K-65, 66, M-72,

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cities, *list* K-64a. *See also in Index*
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American Red Cross R-87b, *picture* R-87b

armor used A-377

casualties, compared with American Civil War, *chart* C-336

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relationships in continent, *maps* A-406-7, 411-12

Korean lespedeza C-360

Korea Strait, channel separating Korea from Japan and connecting Sea of Japan with East China Sea; Russian naval power destroyed here by Japanese in 1905: *maps* K-65, P-16

Korin (*kō'rin*), Ogata (1658-1716), Japanese painter and lacquerer; excelled in idealized flower studies; used white metal and mother-of-pearl in lacquers ('Waves at Matsushima', screen in Museum of Fine Arts, Boston, Mass.).

Korinthos, Greece. *See in Index* Corinth

Koritsa (*kō-rē-tsā*'), Albanian Korçe (*kōr'chē*), town in s.e. Albania; pop. 24,035; in fertile agricultural region A-138, *map* E-23

Körner (*kūr'nēr*), Karl Theodor (1791-1813), German poet and patriot; wrote patriotic songs; died fighting against Napoleon.

Kornfeld, Paul (1889-1942), German writer of expressionistic plays ('The Seduction'; 'Heaven and Hell').

Korngold (*kōrn'gōlt*), Erich Wolfgang (born 1897), Austrian composer, born at Brünn, in Moravia; he showed a remarkable and precocious talent; at the age of 11 he composed ballet 'The Snowman', produced in Vienna; later works for orchestra, stage, and piano showed development in command of material ('Sinfonietta' for orchestra; 'Die Tote Stadt', opera).

Kor'nilov, Laurus Georgievich (1870-1918), Russian general, commanded in Galician campaign during World War I; his unsuccessful mutiny against Kerensky's provisional government (1917) prepared way for later Bolshevik victory; killed in battle against Red army while leading Volunteer army in "ice flight" in the Kuban region.

Korolenko (*kō-rō-lēn'kō*), Vladimir (1853-1921), Russian fiction writer and publicist; born Zhitomir. Russia, of Russian-Polish family; opposed czarism and Communism ('Makar's Dream and Other Stories'; 'The Blind Musician'; 'The Day of Atonement'; autobiography, 'The History of My Contemporary'): R-295

Kortrijk, Belgium. *See in Index* Courtrai

Korzeniowski (*kōr-zō-nýōf'skē*), Teodor Josef Konrad, original name of Joseph Conrad C-451

Korzybski, Alfred Habdank (1879-1950), American scientist, born Warsaw, Poland; Intelligence Department, Russian General Staff in World War I; secretary Polish Commission to League of Nations, 1920; in 1938 became president and director of the Institute of General Semantics ('Manhood of Humanity'—The Science and Art of Human Engineering'; 'Science and Sanity, an Introduction to Non-aristotelean Systems and General Semantics'): C-424b

Kosciusko (*kōs-i-ūs'kō*), or Kosciuszko, Thaddeus (1746-1817), Polish general and patriot K-67

burial place at Cracow C-506

Kosciusko, Mount, in Australian Alps, New South Wales, highest peak in Australia (7328 ft.): *map* A-489

height, comparative. *See in Index* Mountains, *table*

Koshare, a Pueblo Indian priest who acts as holy clown at public religious ceremonies, *color picture* I-97

Kosher (*kō'shēr*), Jewish term for food made ceremonially clean according to Mosaic law

meat M-154

Koshtantan (*kōsh-tān-tou'*), Mount, one of highest peaks in Caucasus Range (16,875 ft.).

Koslee (*kō'shē-tē*), Hungarian Kassa (*kōsh'shō*), German Kaschau (*kāsh'ou*), city in e. Czechoslovakia; pop. 66,968; held by Hungary 1938-45; wool center; 14th-century Gothic cathedral; mineral springs nearby: *maps* E-417, C-535

Kos'lov, Peter Kuzmich (1863-1935), Russian archaeologist; made important explorations and discoveries in Mongolia: E-456

Kosovo, or Kosovo Polje (*kō'sō-vō pō'lyē*), plain in s.w. Yugoslavia near Prizren

battle (1389) S-103, T-220

Kossel (*kōs'ēl*), Albrecht (1853-1927), German physiologist, born Rostock; for his work on chemistry of the cell and for his studies of proteins, he won 1910 Nobel prize in medicine and physiology.

Kossuth (*kōs'uth*), Hungarian Kőszhót), Louis (Hungarian Lajos) (1802-94), Hungarian patriot K-67-8, H-450

Kostelanez, Andrő (born 1901), American orchestra conductor, born in Russia; to U. S. 1922; married Lily Pons, soprano; won popularity as orchestra conductor for Columbia Broadcasting System.

Koster, Laurens Janszoon. *See in Index* Coster, Laurens Janszoon

Kostrowski, Guillaume Apollinaire. *See in Index* Apollinaire, Guillaume

Koto (*kō'tō*), a Japanese harp consisting of a long box over which are stretched 13 strings, each with a bridge; played with both hands and tuned by shifting the bridges.

Kotor (*kō'tōr*), or Cattaro (*kāt'tā-rō*), Yugoslavia, fortified town on Gulf of Kotor, inlet of Adriatic; pop. 5402; excellent harbor.

Kotor, Gulf of, or Cattaro, Gulf of, on Adriatic, *picture* Y-347

Kotzebue (*kōt'sū-bū*), August Friedrick von (1761-1819), German playwright, extraordinarily prolific and popular all over Europe; best-known play 'The Stranger'.

Koussevitzky (*kō-sē-vēt'skē*), Serge (1874-1951), musical conductor, born Tver, Russia; first became

KOREAN CONFLICT CHRONOLOGY

(All dates of action in Korea are Korean time, which is 14 hours ahead of Eastern Standard Time.)

1950

June

25. North Korean (Red) armored forces invade South Korea Sunday morning at dawn (Saturday afternoon, June 24, Eastern Standard Time), starting the conflict.
25. At 5:45 P.M. EST (Sunday), the United Nations issues cease-fire order. Reds refuse.
27. At noon EST, President Harry S. Truman orders the United States air and naval forces in Far East to give armed aid to South Korean forces. At 10:46 P.M. EST, United Nations empowers its members to send armed forces to aid South Korean forces.
28. Seoul abandoned to North Koreans.
30. Truman orders U.S. ground troops into action.

July

1. First U.S. troops enter; flown from Japan.
5. U. S. troops in first battle.
7. The UN asks U.S. to create a unified command.
8. Truman names Gen. Douglas MacArthur commander of UN forces in Korea.
10. First Red atrocities reported.
12. U.S. troops and South Korean forces (ROK) retreat toward Taejon; Lieut. Gen. W. H. Walker takes command of U.S. forces.
20. Reds take Taejon.
31. First reinforcements land direct from United States.

August

3. U.S. and ROK troops pushed back to Nakdong River line in a small defense perimeter based on Pusan; Reds within 40 miles of Pusan.
7. U.S. troops counterattack toward Chinju.
29. First British troops land; from Hong Kong.

September

1. Reds drive within 30 miles of Pusan.
15. U.S. amphibious landing at Inchon.
16. UN forces launch all-out counterattack.
19. Philippine troops land.
- 24-26. UN forces regain Seoul.
28. Australian troops land.

October

1. ROK pushes across 38th parallel; Reds ignore MacArthur's demand to surrender.
- 7-11. U.S., British, Australian forces join ROK beyond 38th parallel.
15. Truman, MacArthur confer on Wake Island.
17. Turkish troops land.
19. UN forces take Pyongyang, North Korean capital.
26. ROK reaches Yalu River at Chosan; UN forces capture first Chinese Communist troops.

November

1. North Korean radio announces Red China "will let volunteers fight in defense of Yalu area"; UN pilots engage first Russian-built MIG-15 jet fighters.
2. U.S. forces hard hit by Red Chinese at Unsan.
7. Thailand (Siam) troops land.
23. Netherlands troops land.
24. UN forces launch "end of war" offensive.
26. Red counterattack smashes UN drive; UN forces begin long retreat.
27. U.S. forces cut off in Chosin reservoir area.
28. French troops land.

December

5. Pyongyang abandoned to Reds.
8. Greek troops land.

18. Canadian troops land.
23. Lieut. Gen. W. H. Walker dies in jeep accident.
24. End evacuation, by ship, of 105,000 U.S. troops from Hungnam beachhead.
26. Lieut. Gen. Matthew B. Ridgway takes command of UN forces in Korea.

January

1. Reds launch general offensive.
2. New Zealand troops land.
3. UN forces abandon Seoul second time.
17. Reds reject UN cease-fire request.
25. UN forces launch offensive for "war of maneuver."
31. Belgium-Luxemburg troops land.

February

1. UN denounces Red China as "aggressor."
12. ROK drives across 38th parallel.

March

7. MacArthur asserts conflict will stalemate if UN forces not permitted to attack Red bases in Manchuria.
15. UN forces retake Seoul.
24. MacArthur invites retreating Communist leaders to confer with him in the field to end the war "without further bloodshed." Refused. UN forces resume northward drive.

April

11. General MacArthur relieved of all his commands in Far East by Truman.
12. General Ridgway made Supreme Commander of Allied Powers. Lieut. Gen. James A. Van Fleet takes command of UN forces in Korea.
22. Reds launch counteroffensive with some 600,000 troops in "human sea" mass attacks.
29. Red offensive halts on outskirts of Seoul in west and 40 miles below 38th parallel in central Korea.

May

3. UN forces launch limited counterattack.
5. Ethiopian troops land.
16. Reds advance in offensive drive.
- 19-21. UN forces stem drive and counterattack.

June

15. Colombian troops land.
23. Russia's delegate to the UN, Jacob Malik, in a radio speech, suggests possibility of a cease-fire.
30. General Ridgway proposes meeting to discuss armistice.

July

10. First meeting of UN and Red representatives, at Kaesong on 38th parallel.

August

23. Reds suspend armistice talks.

September

13. UN launches attack on "Hearthbreak Ridge."

October

25. Armistice talks resume, after move to Panmunjom.

December

18. UN and Red commands exchange prisoner of war lists. Reds list 11,559 names; UN has 132,474 Red POW's.

1952

- January
 24. Armistice talks stalemated.
 27. Talks resumed.
- February
 6. Chinese Reds drop their title of "volunteer troops" and list themselves as equal partners with North Korea in "opposing the UN in Korea."

18. Red prisoners riot in UN camp on Koje Island off Pusan.
22. Reds broadcast UN wages "germ warfare" in Korea.
24. U.S. Navy starts second year of shelling Wonsan.

March

4. Syngman Rhee protests armistice talks; insists on unified Korea and withdrawal of Chinese Reds.

April

- 12-15. Battle lines seesaw in intensified fighting.

May

7. Red prisoners on Koje Island seize Brig. Gen. F. T. Dodd, compound commander; hold for 3 days.
12. Gen. Mark W. Clark succeeds General Ridgway as Supreme Commander.

June

- 21-22. U.S.-Philippine troops hold "T-Bone" and "Pork Chop" bills against savage Red attacks.
23. UN bombers blast hydroelectric plants on the Yalu.

July

3. Russia vetoes U.S. request in UN to have International Red Cross investigate North Korean charges that UN forces engage in germ warfare.
10. Armistice talks enter second year.
- 11-12. UN land and carrier-based planes bomb Pyongyang in 24-hour attack.

August

1. U.S. troops win "Old Baldy" after ten-day battle.
5. UN air force warns, by radio and leaflets, inhabitants to evacuate 78 North Korean towns marked for air raids.
- 6-7. ROK takes "Capitol Hill."
12. U.S. Marines take "Siberia Hill" and "Bunker Hill."

September

5. U.S. Navy uses guided missiles on North Korean plants; sent 150 miles from aircraft carrier *Boxer* in first known use in actual warfare.
- 28-30. Reds seize three hill positions.

October

6. Reds launch attacks on 35 UN positions.
8. Truce teams take indefinite recess in armistice talks.

November

- 1-30. Hill positions change hands repeatedly in hard fighting.

December

- 2-5. Dwight D. Eisenhower, U.S. president-elect, tours area near battle line.

1953

- January
 25. UN launches heavy attack, "Operation Smack."

February

11. Lieut. Gen. Maxwell D. Taylor takes over command from General Van Fleet, retiring from Army.
22. General Clark proposes exchange of sick and wounded prisoners.

March

17. UN throws back heavy attack on "Little Gibraltar."
26. Reds capture "Old Baldy."

April

11. Reach agreement on prisoner exchange: 605 UN troops for 6,030 Reds.
20. Exchange starts.

May

- 1-31. Ground fighting and air fighting sharpen. UN forces driven from several outposts.

(Continued on the next page)

KOREAN CONFLICT CHRONOLOGY—Concluded

- June
9. South Korean assembly votes against truce terms; calls on ROK to "be prepared for a northward advance."
12-15. Reds step up attack.
18. President Syngman Rhee defies UN and releases 25,000 anti-Red North Korean prisoners.
20. Truce talks stall over Rhee's action.
July
8. Reds agree to renew truce talks.
13. Reds launch major attack.
16. UN begins counterattack.
27. Armistice signed at Panmunjom at 10:01 A.M., after 3 years and 32 days of conflict; hostilities were ended 12 hours later, at 10:00 P.M.
- United Nations members that contributed combat forces: Australia, Belgium, Canada, Colombia, Ethiopia, France, Greece, Luxemburg, the Philippines, the Netherlands, New Zealand, Thailand (Siam), Turkey, Union of South Africa, the United Kingdom, the United States.
United Nations members that sent medical support units: Denmark, India, Italy, Norway, and Sweden.
The United States supplied 90 per cent of the UN forces. Approximately 1,600,000 United States military personnel—Army, Navy, Air Force, Marine Corps—served in the Far East area during the Korean conflict.
United States casualties (preliminary, Aug. 16, 1953): 22,731 killed in action; 105,961 wounded; 13,585 missing; total, 142,277.
Other United Nations casualties: about 14,000.
South Korean casualties (preliminary): about 300,000.
Red casualties: estimated from 1,500,000 to 2,000,000.
South Korean civilian casualties: estimated from 1,000,000 to 1,500,000.
UN prisoners of war returned by Reds: 17,670, of whom 4,910 were Americans.
Red prisoners of war returned by UN forces: 75,799, of whom 70,159 were North Koreans. In addition, some 7,800 North Korean POW's and about 14,500 Chinese Red POW's refused repatriation.

known as double-bass soloist in Imperial Theatre Orchestra; organized own orchestra and made concert tours; conducted orchestras in most European countries; conductor Boston Symphony Orchestra 1924-49; director Berkshire Music Center at Lenox, Mass., 1940-51.
Kovno, Lithuania. See in Index
Kaunas

Koweit, Arabia. See in Index
Kuwait
Kowloon, small peninsula and port of China opposite Hong Kong H-418, 419, map C-260, picture H-262
Kowtow (kō-tou'), origin of term C-279

Koxin'ga, Chinese Cheng Ch'eng-kung (gūng' chūng' gūng') (1623-63), Chinese pirate-patriot F-242a

Kra, monkey M-352

Kraal (krāl'), native village in Africa S-144, K-34b, A-43, color picture A-38

Kraepelin (krā'pē-līn), Emil (1856-1926), German psychiatrist, professor at University of Munich; revised classification of mental diseases; analyzed fatigue process and investigated influence of alcohol on various mental processes.

Krafft, or Kraft (krāft'), Adam (1452?-1509), principal German sculptor of late Gothic period; birthplace probably Nuremberg, Germany; executed tabernacles, tombs, reliefs, and religious figures; work robust and realistic, done only in stone.

Kraft (krāft) paper P-69, P-258

Kra Isthmus, also Krah Isthmus, Siam (Thailand) S-169, 170, map I-123

Krait, or krait (krīt), a snake S-207

Krakatoa (krā-kā-tō'a), small volcanic island in Indonesia between Java and Sumatra
eruption of (1883) V-518, 520, F-146
state reserve N-39

Krakow, Poland. See in Index
Cra-cow

Kranach, Lucas. See in Index
Cranach

Krasnodar (krās'nō-dār), Russia, formerly Ekaterinodar (yē-kāt-ēr-ēn-ō-dār'), fortified city of n. Caucasus on Kuban River 90 mi. e. of Black Sea; pop. 200,000; farming, cattle raising, and fishing interests; maps R-267, B-204

Krasnovodsk (krās'nō-vōtsk), Russia, port on e. shore of Caspian Sea, in Turkmen S.S.R.; pop. 30,000; oil refinery; on Trans-Caspian Railroad; maps I-224, A-406

Krasnoyarsk (krās'nō-yārsk), Russia, territory in central Siberia in R.S.F.S.R., extending from Sayan

Mountains on the south to Arctic Ocean on the north; area about 928,000 sq. mi.; cap. Krasnoyarsk; gold, lumber; map R-260

Krasnoyarsk, Russia, Siberian city on Yenisei River and Trans-Siberian Railroad; capital of Krasnoyarsk Territory; pop. 300,000; machinery; lumber, paper, and cement industries; flour milling; map A-406

Krassin (krās'in), Leonid Borisovich (1870-1927), Russian political leader and diplomat; Soviet delegate to various international conferences; diplomatic representative at Paris, later at London.

Kratzer, Nicholas, astronomer to Henry VIII of England, picture H-406

Krebs, Hans Adolf (born 1900), British scientist, born Hildesheim, Germany; with F. A. Lipmann shared 1953 Nobel prize in medicine and physiology for research in cell metabolism; professor of biochemistry Oxford University 1954-.

Kredel, Fritz (born 1900), artist and illustrator, born Michelstadt, Germany; taught art in Germany; to U. S. 1938; illustrated for children: Andersen's 'Fairy Tales'; Grimm's 'Fairy Tales'; 'Pinocchio', by Carlo Lorenzini.

Krefeld, also Crefeld (krä'fēlt), Germany, manufacturing town 30 mi. n.w. of Cologne; pop. 171,875; famous textile institute; maps E-111, E-424

Krehbiel (krā'bēl), Henry Edward (1854-1923), music critic and writer, born Ann Arbor, Mich.; music critic *Cincinnati Gazette* 1874-80, *New York Tribune*, 1880-1923; known as "dean of American critics" ('How to Listen to Music'; 'Chapters of Opera').

Kreisler (krēs'lēr), Fritz (born 1875), American violinist and composer, born Vienna, Austria; through artistry and musical grace became world-wide favorite; served in Austrian army in World War I and was wounded at Lemberg; returned to concert stage; composed songs, violin pieces ('Caprice Viennois'), and an operetta ('Apple Blossoms').

Krem'lin, ancient citadel of a Russian city
Kiev R-284

Moscow M-396, 398, pictures M-397, R-256; Czar Kolokol bell B-121

Kremnitz, Mite, or Marle (1852-1916), German writer in Bucharest. See also in Index Carmen Sylva

Krenek, Ernst (born 1900), Austrian composer of Czech descent, born

Vienna; extreme modernist in style; won first widespread fame with 'Jonny spielt auf', jazz opera; followed this with other operas, including 'The Life of Orestes'.

Kresge, S. S., Company, 5-and-10-cent chain store, started 1897 in Detroit by S. S. Kresge; C-181

Krete, island in Mediterranean. See in Index
Crete

Krentzer (kroīt'zēr), Konrad (1780-1849), German pianist, conductor, and composer of operas, church music, and chamber music (light opera, 'Nachtlager von Granada').

Kreutzer, Rudolph (1766-1831), French violinist of German extraction; wrote many operas and instrumental works. Beethoven dedicated to him the famous sonata for violin and piano known as the Kreutzer sonata.

Kreuzotter (kroīt'sót-ēr), a viper V-477

Kreymborg (krām'bōrg), Alfred (born 1883), poet, born New York City; founded *The Glebe* and *Others*, magazines of free verse; 'a whimsical radical' ('Apostrophes', 'Mushrooms', 'Plays for Merry Andrews', 'Our Singing Strength'); also wrote radio plays.

Kriemhild (krēm'hilt), in the Nibelungenlied, wife of the hero Siegfried S-177, N-232

Kriemhilde Line (in World War I), German defensive position in Meuse-Argonne region M-185

Krim, Mohammed ben Abd el (born 1883?), Rifian chief M-395

Krim, Russia. See in Index
Crimea

Krimmer, a gray lamb fur, looser in curl than Persian lamb; chief source Crimean Peninsula.

Kris, Malay dagger, picture S-484

Krish'na, a Hindu god H-357

Jagannath celebration, picture I-57

'Krishna Holding Mount Govardhan', miniature painting P-37b, color picture P-37d

Kriss Kringel, German name for Santa Claus S-43

Kristensen, Leonard, Norwegian whaling captain; member of small party, the first persons to land on Antarctic Continent (1895); table P-349

Krivol Rog (kryi-voī' rōk'), Russia, city in Krivol Rog district in s. Ukraine; pop. 200,000; iron and steel center; K-38, R-277, maps R-267, E-417

Kroger, Bernard Henry (1860-1938), banker and grocer, born Cincinnati, Ohio; founded Kroger Grocery and Baking Co. (1882) which developed into a grocery chain; C-181

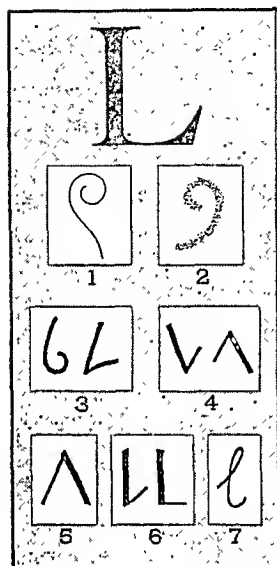
- Krogh** (*krôfj*), (Schack) August (Steenberg) (1874-1949), Danish physiologist, born Grenaa, Denmark; noted for experiments in respiration and for researches in capillaries and the blood; awarded 1920 Nobel prize in medicine and physiology.
- Krogh**, Christian (1852-1925), Norwegian painter and author; depicted sea and seamen with realism and strength; wrote novels and books on art painting, *picture* A-187
- Krolewska Huta** (*kru-lëf'skå hy'tä*), German Königshütte (*kä-niks-hüt'ë*), Polish city in s.w. Silesia, 170 mi. s.w. of Warsaw; ironworks; center of coal and metal mining; pop. about 142,000.
- Kroll**, Leon (born 1884), painter, born New York City; simple, strong, and highly individual in landscape, still life, and figure work.
- Krona** (*krô'na*), a monetary unit of Sweden and Iceland; historical value about 27 cents.
- Kronborg Castle**, Denmark, *picture* D-68
- Krone** (*krô'në*), monetary unit of Denmark and Norway; for current values, *see in Index* Money, *table*. Also various former gold coins of central Europe.
- Kronos** (*krôn'ôs*), or Cronus, in Greek mythology, Titan ruler of universe R-132
- Identified with Saturn S-49
- Kronstadt**, or Kronsstadt (*krôn'shtît*), Russia, port and naval base on island of Kotlin in Gulf of Finland 20 mi. w. of Leningrad; founded 1710 by Peter the Great; *map* R-266
- Kronstadt**, Rumania. *See in Index* Brasov
- Kroo**, African tribe. *See in Index* Kru
- Kroon** (*krôn*), a monetary unit of Estonia; historical value about 26½ cents.
- Kropotkin**, Peter, Prince (1842-1921), Russian geographer and anarchist; first to show that structural lines of the Asiatic continent run s.w.-n.e.; exiled and imprisoned for advocating peaceful anarchy anarchistic doctrine C-427
- Krueger**, Karl (born 1894), orchestral conductor born Atchison, Kan.; studied at Heidelberg, Germany, and Vienna, Austria; conductor Seattle Symphony Orchestra, Kansas City Philharmonic; conductor Detroit Symphony Orchestra 1943-49.
- Krug**, Julius A (Albert) (born 1907), public power expert and government official, born Madison, Wis.; with Tennessee Valley Authority 1938-40, War Production Board 1942-45, chairman after Sept. 1944; U. S. secretary of the interior 1946-49.
- Kruger** (*krü'gër*), Paul (1825-1904), Boer patriot, known as "Oom Paul" (Uncle Paul); president of South African Republic (Transvaal) 1883-1901; B-220, S-245
- Cecil Rhodes and R-144
- Kruger National Park**, in Union of South Africa N-39, S-242
- Kruglov**, Sergei Nikiforovich (born 1900?), Russian secret police chief; deputy commissar for internal affairs during World War II; minister of internal affairs Jan. 1946-March 1953 and after July 1953.
- Krumgold**, Joseph (born 1906), author and motion-picture producer, born Jersey City, N. J.; won 1934 Newbery medal for "... and now Miguel", based on documentary film he made for Department of State.
- Krung Thep**, Siam (Thailand). *See in Index* Bangkok
- Krupp** (*krujp*), Alfred (1812-87), German "cannon king," son of Friedrich and father of Friedrich Alfred Krupp; discoverer of method of casting steel in large pieces; made great guns used (1870-71) in the siege of Paris.
- Krupp**, Friedrich (1787-1826), German ironmaster, founder of house of Krupp and of great Krupp works at Essen; introduced manufacture of cast steel into Germany; died in poverty; E-398
- Krupp**, Friedrich Alfred (1854-1902), son of Alfred and grandson of Friedrich Krupp; handed on the Krupp business to his daughter, Bertha.
- Krupp steel works** E-398
- Krupp von Bohlen und Halbach**, Bertha (born 1886), eldest daughter of Friedrich Alfred Krupp; brought up to manage Krupp works at Essen, which she inherited at 16; married Baron Gustav von Bohlen und Halbach (1870-1950), who added Krupp to his name and became chief director of works.
- Krutch**, Joseph Wood (born 1893), critic and essayist, born Knoxville, Tenn.; drama critic and associate editor *The Nation* 1924-32, literary editor 1933-37; English professor Columbia University since 1937 ('Samuel Johnson'; 'The Twelve Seasons'; 'The Desert Year'; 'The Best of Two Worlds'; 'Modernism in Modern Drama').
- Krylov** (*krä'löf*'), Ivan Andreievitch (1768-1844), noted Russian fabulist; wrote fables largely in language of peasants, satirizing the life of his time; R-294
- Krypton**, a colorless, odorless gas belonging to the helium group of inert elements, *tables* P-151, C-214
- formed from U-235, an isotope of uranium A-466, *diagram* A-465
- Kshatriya** (*kshät'rî-ya*), a Hindu of the soldier caste I-58, H-357
- K-type blimp**, *picture* B-33
- Ku**, Hawaiian god H-289
- Kua's Lampur** (*kwä'lä lum-pur*'), capital of Federation of Malaya; on Malay Peninsula near w. coast, in state of Selangor; pop. 175,961; tin, rubber; *maps* A-407, I-123, *picture* M-58
- Kuang-Hsu**. *See in Index* Kwang-Su
- Kuan hua**, official language of China, also called Mandarin C-275
- Kuan Yin**, Buddhist divinity, goddess of mercy *picture* E-342
- Kuanza River**, in Angola. *See in Index* Cuanza
- Kuban' River**, 500 mi. long, flows across w. half of n. Caucasus and receives many affluents from Caucasus Mts., *maps* B-204, R-267
- Kubelik** (*kqb'el-ëk*), Jan (1880-1940), Bohemian violinist; father of Jeronym R. Kubelik; popular and brilliant concert virtuoso.
- Kubelik**, Jeronym Rafael (born 1914), Czechoslovak conductor and composer, born near Prague; made tour as conductor and piano accompanist for father, Jan Kubelik, 1934-35; conductor Czech Philharmonic Orchestra, Prague, 1942-48; conductor Chicago Symphony Orchestra 1950-53.
- Kubelsky**, Benjamin. *See in Index* Benny, Jack
- Kubla Khan** (*ky'bli kân*) (1216-94), one of greatest, most intelligent, and most cultured of Mongol rulers, grandson of Genghis Khan M-345
- completes Grand Canal, China C-108a
- Marco Polo visits P-364
- Kuching**, seaport, capital of Sarawak, on island of Borneo; pop. 37,949; *maps* A-407, E-202
- Kudu**, also koodoo, one of the largest of African antelopes; white stripe down the back and 8 or 10 vertical stripes descending from it down the sides; *picture* A-263
- Kudzu-vine** (*kud'zö*'), a perennial twining climber (*Pueraria thumbergiana*) of the pea family, native to China and Japan; leaves in 3 parts, flowers in purple clusters; in Japan, roots used as starch source and inner bark in cloth; in s. United States, plant used as forage crop, to enrich worn-out land, and to protect against erosion.
- Kuen Lun Mountains**, in central Asia. *See in Index* Kunlun Mountains
- Kufara**, in Libya. *See in Index* Cufra Oases
- Kühlmann** (*kül'män*), Richard von (1873-1948), German diplomat; secretary of state for foreign affairs 1917-18, negotiating treaties with Russia and Rumania; opposition of army high command and Chancellor Hertling caused him to resign.
- Kuhn**, Walt (1877-1949), modernist painter, born New York City; simple, positive design; brilliant often raw color; noted for paintings of women of stage and circus, also of flowers.
- Kuibyshev** (*kwë'bî-shëf*), also Samara, Russia, port city on Volga and Samara rivers 525 mi. s.e. of Moscow; pop. 600,000; flour milling; large trade; temporary Soviet capital in World War II; *maps* R-267, E-417
- Kuiper** (*koi'për*), Gerard Peter (born 1905), American astronomer, born Netherlands; to U. S. 1933; with University of Chicago at Yerkes Observatory after 1936, director after 1947, also director of McDonald Observatory, Fort Davis, Tex.; author of articles and books in field of astronomy.
- Ku K'ai-chih** (*kä'ki'chi*) (850?-412), Chinese painter; remarkable expression with minimum detail; sure, rhythmic line; best known for a series of paintings on silk in British Museum, illustrating an essay 'The Admonition of the Instructress in the Palace'.
- Ku Klux (ku klüks) Klan**, secret society organized at Pulaski, Tenn., by Southern whites at the close of American Civil War L-355, U-387
- Ku Klux Klan**, Knights of, society founded in 1915 by William J. Simmons, admitting only native-born, white, Protestant, American citizens; founded in Georgia, but spread to every state in the Union; R-86
- Kukri** (*kq'kri*), a sword S-485, *picture* S-484
- Kukul** (*kq'kq-ë*) nut, another name for the candlenut. *See also in Index* Candleberry tree
- in Hawaii H-288b
- Kukulean**, Mayan name for the herogod Quetzalcoatl M-144, M-204
- temple, *picture* M-134
- Kulaks**, well-to-do Russian peasants R-290
- Khlek Bogazi**, pass in Asia Minor. *See in Index* Cilician Gates.
- Kullma**, Charles (born 1903), operatic tenor, born New Haven, Conn.; member Metropolitan Opera Co., New York City, from 1935.
- Kuma** (*ku-mä*'), river of n. Caucasus, Russia; from mountains near

- Pyatigorsk, it flows e. until absorbed by desert; reaches Caspian Sea in flood time only; about 400 mi. long: C-155, map R-267
- Kumasi** (*kū-mā'si*), or **Coomassie** (*kō-mās'i*), capital of Ashanti, Gold Coast, w. Africa; pop. 77,689; G-134a, map A-46
- Kumkum**, forehead decoration worn by Indian girls and women, except orthodox Hindu widows I-61
- Kumquat**, a small citrus fruit of the genus *Fortunella* L-244
- Kun, Bela** (*bā'lū kōn*) (born 1886), Hungarian leader; captured by Russia in World War I, he became follower of Lenin; organized revolution in Hungary and set up a soviet rule; overthrown; became member of executive committee, Communist International: H-450
- Kunersdorf** (*kū'nērs-dōrf*), Poland, former Prussian village 4 mi. e. of Frankfurt-on-the-Oder; Prussians defeated by Russians and Austrians 1759 (Seven Years' War); included in Poland since 1945.
- Kung, H. H.** (born 1881), Chinese leader, born Shansi; governor, Central Bank of China. 1933-45; vice-president of executive department of national government 1933 and again 1939; minister of finance 1933-44. See also in *Index* Soong
- Kunlynsht** (*kū-ni-yō'shū*). **Yasno** (1893-1953), American painter and lithographer, born Japan; identified with modernists; to U. S. 1906 'Dream' D-140d, picture D-140d
- Kunlun Mountains**, also **Kuen Lun** **Mtntals**, in central Asia on n. border of Tibet; highest peak estimated 25,000 ft.: C-258, maps C-259, A-406, 411
- Kunming**, manufacturing city in Yunnan province, China; n.e. terminus Burma Road; pop. 293,961: maps C-260, A-407
- Kunz, George Frederick** (1856-1932), gem expert, born New York City; research curator of gems, American Museum of Natural History; kunzite named for him.
- Kunzite** (*kūnts'it*), a semiprecious stone found in California and Madagascar; phosphorescent after exposure to radium: M-266
- Kuomintang** (*kūō'min'dāng'*), name for the Chinese Nationalist party, meaning literally "The People's Party," upholding principles of Dr. Sun Yat-sen—nationalism, democracy, and livelihood for the people C-281, 282, 283, 284-5, C-228, 229 flag F-136d, color picture F-134
- Kuprlo** (*kō'prin*), **Alexander Ivanovich** (1870-1938), Russian writer of novels, short stories, sketches; power undisciplined by formal literary education ('The Duel', 'Sasha', 'Yama'): R-295
- Kura**, principal river of Transcaucasus, flowing s.e. 820 mi. into Caspian Sea; navigable 350 mi.: maps T-215, R-267
- Kurbash**, or **courbash**, a whip of heavy hide; term also applied to forced labor under the lash, outlawed in Egypt under British rule.
- Kurdistan**, mountainous region in s.e. Turkey, n. Iraq, n.w. Iran, and n.e. Syria K-68
- Kurds**, Mohammedan tribes of Asia Minor K-68
- Armenian massacres** A-375
- Iran** I-222
- rugmaking** R-248
- Turkey** T-218
- women's costume**, picture R-250
- Kure** (*kūr'ē*), Japan, naval port on Honshu Island and Inland Sea; pop. 187,775; armament factory: map A-406
- Kuria Murla** (*kūr'i-ū mūr'ē-ū*) Islands, group of five high, rocky islands off s. coast of Arabia, part of British colony of Aden; 28 sq. mi.; pop. about 70; inhabited by Arabs; cable station: maps A-285, A-407
- Kuril** (*kō'rīl*) Islands, or **Kurile Islands**, also **Chishima**, volcanic group stretching n.e. from Hokkaido; 6146 sq. mi.; pop. about 6000; name from Russian *kurit* ("to smoke") in allusion to volcanoes; owned by Japan 1875-1945, occupied by Russia 1945: maps J-297, A-406
- seal herds** S-88
- Kuroki** (*kū-rō'kē*), **Itei, Connt** (1844-1923), Japanese general and samurai; distinguished in Sino-Japanese War of 1894-95; in Russo-Japanese War of 1904-5 commanded First Army, defeated Russians at Yalu River, and assisted Oyama at Mukden.
- Kuropatkin** (*kō-rō-pāt'kin*), **Alexei Niko'aievich** (1848-1925), Russian general; in supreme command in East during Russo-Japanese War, until after battle of Mukden, in which he was defeated; again commanded an army 1916 in World War I; retired to private life 1917.
- Kuroshio**. See in *Index* Japan Current
- Kurtz, E'rem** (born 1900), conductor, born St. Petersburg (now Leningrad), Russia; musical director Ballet Russe de Monte Carlo; conductor Kansas City (Mo.) Philharmonic Orchestra 1943-48; conductor Houston (Tex.) Symphony Society from 1948.
- Kur'umba**, a wild tribe of the Nilgiri Hills in s. India; live in huts of mud and wattle and depend largely upon the jungle for food.
- Kurusu** (*kō-rō-sp*), **Saburo** (1888?-1954), Japanese diplomat, born Yokohama W-258
- Kus'kokwim River**, one of chief rivers of Alaska; 550 mi. to Bering Sea: maps A-135, N-250
- Kusten'e**, **Rumanla**. See in *Index* Cons'anta
- Kutahya**, or **Kutajah** (*kū-tā-yā'*), Turkey, trade center 75 mi. s.e. of Bursa: pop. 19,547.
- Kut-al-Amara** (*kūt-ēl-a-mā'ra*), also **Kut-el-Imara**, Iraq, town on Tigris River, 105 mi. s.e. of Baghdad; railroad terminus; coaling point World War I W-223
- Kutani ware**, Japanese porcelain made originally from materials found near Kutani-mura, village near Kanazawa, Japan; oldest and best period (1664-1750) widely collected. Ware ranges from stoneware to fine porcelain, glazes from green through Indian red and brown potter making, picture J-319
- Kutaradja**, **Sumatra**. See in *Index* Koetaradja
- Kutb Minar**, tower at Delhi, India, picture D-61
- Kutb-ud-Din**, a slave who became sultan of Delhi, founder of Slave Dynasty in India (1206-88) tower begun in his reign, picture D-61
- Kutch**, or **Cutch** (*kūch*), state in w. India; area 16,724 sq. mi.; pop. 567,606; cap. Bhuj; formerly one of the Western India States: map I-68a. See also in *Index* Rann of Cutch
- Kutchin** (*kū-chīn'*), Indian tribe that lives in Yukon Territory, Canada, and Alaska, map I-106f, table I-107
- Kutchuk-Kainordji** (*kuch'uk-kī-nūr'-jē*), Treaty of (1774), between Turkey and Russia, giving Russia strong position on Black Sea.
- Kutenal Indians**. See in *Index* Kootenay Indians
- Kuvass**, a working dog, originally from Tibet, table D-118b
- Kuwait** (*kū-wīt'*), **Kuweit**, or **Kowelt**, sheikdom, under British protection, in n.e. Arabia, on n.w. coast of Persian Gulf; about 1930 sq. mi.; pop. 170,000; exports pearls, horses, wool; cap. and seaport, Kuwait (pop. 80,000): A-285, maps A-285, A-406
- petroleum** A-288
- relationships in continent**, maps A-406-7, 411-12
- Kvntzoth** (*kūt-zōth'*), communal colonies in Palestine P-46
- Kwa'alein** (*kūā-gū-lān'*), largest atoll in Marshall Islands, in Ralik group; pop. 1081; contains Kwajalein Island; occupied by U. S. 1944: map P-16. See also in *Index* Marshall Islands
- Kwakintl** (*kūw'ki-qtł*), a group of Indian tribes that live near Fort Rupert, British Columbia, Canada, map I-106f, table I-107
- Kwammu**, also **Kwammu Teono** (738?-805), emperor of Japan 782-805; conquered Ainus moved capital to Kyoto K-68
- Kwangchow**, China. See in *Index* Canton
- Kwangchowan**, or **Kwangchow**, China, on s. coast between Hong Kong and the island of Hainan; leasehold of France 1899-1945; 325 sq. mi.; pop. 268,416: map C-260
- Kwango** (*kūāng'gō*) River, Portuguese Cuango (*kūāh'gō*), about 700 mi. long, rises in Angola in Africa and flows n. into Belgian Congo, forming part of border, map B-109
- Kwangsi** (*kūāng'sē*), inland province of s. China; 84,007 sq. mi.; pop. 14,603,247; cap. Nanning (Kwelin); commercial center Wuchow; cassia, grain, metals, gems: map C-260
- Kwang-Su**, or **Kuang-Hsu**, the reign title of Tsai T'ien (1872-1908), emperor of China, during whose reign occurred the war with Japan, the Boxer uprising, and the occupation of Peking by the United Powers: C-281
- Kwangtung** (*kūāng'dung'*), province of s.e. China; 83,940 sq. mi.; pop. 27,825,512; cap. Canton; considerable mineral wealth (gold, coal, iron); large exports of silk; chief cities Hong Kong, Macao, Canton: map C-260
- Kwantung** (*kūwān'dung'*), former Japanese leased territory on s. tip of Liaotung Peninsula. s. Manchuria; area 1438 sq. mi.; soybeans, cereals, salt, fish. Kwantung was leased to Japan by China in 1905, but, after World War II, most of Kwantung was included in Port Arthur-Talien (Dairen) administrative district: map C-260
- Kwan-Yin**. See in *Index* Kuan Yin
- Kweilchow** (*kūē-chōu'*), province of s.w. China; 69,297 sq. mi.; pop. 10,518,765; cap. Kweiyang (240,855); gold, silver, mercury, tin, coal, and iron: map C-260
- Kyakhta** (*kūāk'tā*), Russia, city on n. border of Mongolian People's Republic, about 170 mi. n. of Ulan Bator; transit point for trade between Russia and Mongolia: M-344, maps M-343, A-406
- Kyanite** (*kī'a-nīt*), or **cyanite** (*sī'a-nīt*), an aluminum silicate; color-

less, or blue, white, gray, green or brown; sometimes cut as gem.
Kyd (*kíd*), Thomas (1558-94), English dramatist, born London; one of most important predecessors of Shakespeare; known for 'The Spanish Tragedy'.
Kyne, Peter Bernard (born 1880), novelist, born San Francisco, Calif.; clerk general store, lumber broker, reporter; served in Spanish-American War and World War I

('Cappy Ricks', 'The Valley of the Giants', 'The Enchanted Hill').
Kyokutei Bakin. *See in Index* Bakin
Kyoto, or **Kioto** (*kyō'tō*), former capital of Japan; pop. 1,101,854: K-68, *maps* J-297, A-406
 art museum J-314
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Kyrie eleison (*kī'rī-ē*, also *kē'ri-ē*, *ē-lā'i-sōn*), Greek words, meaning "Lord have mercy upon us," used as form of prayer in both Greek and

Roman Catholic churches, and also (translated) in Anglican church.
Kythera island in Ionian Sea. *See in Index* Cerigo
Kyushu, also **Kiushu** (*kū'shū*), southernmost of four main islands of Japan; area about 16,000 sq. mi.; pop. 12,096,869; mountainous and volcanic; extensive coal mines; copper, rice, tea, tobacco: *maps* J-297, A-406, *picture* J-295
 harbors J-296



OUR LETTER L probably started in Egyptian writing as a picture of a looped rope (1). To the Egyptians, this picture meant 'loop of rope'; but soon after 2000 B.C., a Semitic people called the Seirites used the picture as an alphabetic sign for the sound of 'l'. They did this because their word *layah* or *loyah* for 'rope' began with this sound.

The Seirites made the sign as a line with a loop (2). The later Canaanite-Phoenician alphabet sharpened the sign into an angle (3), suitable for writing in Semitic fashion from right to left. In Hebrew it was called *lamedh*.

When the Greeks learned to write from the Phoenicians, they turned the letter around for writing from left to right, and renamed it *lambda* (4). Later they gave it a more graceful shape (5); but before this happened the Romans had adopted the earlier shape into the Latin alphabet (6). English writing took the Latin capital L without change.

In late Roman times the small handwritten 'l' was developed from the Greek 'l' by carrying the left-hand stroke up through a loop and then down and to the right (7). Our printed small 'l' is the result of compressing the handwritten loop into a long, upright line.

NOTE.—For the story of how alphabetic writing began and developed, *see* the articles Alphabet; Writing.

Laaland (*lā'lān*), also **Lolland**, Danish island in Baltic Sea; 479 sq. mi.; pop. 87,150: *map* D-71

La Angostura Dam, in Mexico, on Bavispe River. *See also in Index* Dam, *table*

La'an, father of Rachel and Leah, and uncle of Jacob; in return for Jacob's long service, Laban gave him both daughters in marriage; after a quarrel Jacob outwitted Laban and got most of his uncle's flocks (Gen. xxviii-xxxii).

Laban, Rudolf von (born 1879), dancer and teacher of dancing, born Hungary; taught many years in Germany; originated a new system of dance and devised a method of dance notation: D-14k

La Barre, Joseph Antoine Lefebvre de (1622-88), governor of New France (Canada) 1682-84; failed to conquer the Iroquois and was recalled.

La Befana, Italian Christmas character C-295

Labiate (*lā-bī-ā'tē*), plant family including mint, catnip, and ground ivy M-291

Labiche (*lā-bēsh'*), Eugène M. (1815-88), French dramatist ('Le Voyage de M. Perrichon').

'**La Bohème**' (*lā bō-ēm'*), opera by Giacomo Puccini story O-389

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Index Minimum wage; Wages

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Labor party, British, formed 1906 to represent organized labor and Socialists; co-operated with Liberals, later adopted socialistic program: E-369e, 370, 372, 373, S-217-18, L-75
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Labouchère (lă-bô-shêr'), Henry du Pré (1831-1912), English journalist and radical political leader, editor of the weekly *Truth*, noted for exposure of public frauds.
Labouchère, Pierre Antoine (1807-73), French painter, born Nantes, France; known for paintings of the Reformation
painting of Calvin leading Geneva discussion, *picture* R-92
Labrador, a peninsula, most easterly part of the North American mainland; area over 500,000 sq. mi.; e. triangle of Labrador Peninsula (area 112,630 sq. mi.; pop. 7890), together with Newfoundland, forms Province of Newfoundland, Canada: L-76, *maps* C-69, 73, P-346, *picture* L-76
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work of Dr. Grenfell G-215
Labrador Current, or Arctic Current, sometimes called Labrador Stream A-452, *map* O-335
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Labrador duck, an extinct black-and-white sea duck closely allied to eider duck; ranged north Atlantic coast of North America as far south as Long Island, N.Y.; believed to have bred in Labrador, Canada.

Labrador ice sheet I-5, map I-6

Labradorite, a gem J-350

Labrador retriever, a dog, color picture D-112, table D-118

Labrador tea, evergreen shrub (*Ledum groenlandicum*) of heath family; found in swamps of Greenland and Labrador, Canada; used for tea.

La Brea pits, Los Angeles, Calif. S-1, L-316

La Bretonne, Restif de. See in Index Restif de la Bretonne

La Bruyère (lā brū-yêr'), Jean de (1645-96), French essayist and wit, a moralist, born Paris; one of best writers of classical French ('Caractères', 'Mémoires').

Labuan (lā-bū-ān'), British island off N. Borneo; formerly one of Straits Settlements; became part of North Borneo 1946; 35 sq. mi.; pop. 8784; maps E-202, A-407

Laburnum, small tree of pea family native to S. Europe; cultivated for showy yellow flowers, glossy foliage; all parts poisonous; in United States called bean tree or golden-chain.

Lab'yrinth, name given by Greeks and Romans to buildings, entirely or partly underground, with intricate winding passages. See also in Index Maze

Crete C-510, T-117

Lab'yrinth, of ear E-170-1

Lac (lāk), resinous substance, consisting of shellac and crimson coloring matter, secreted by scale insects L-82

Laccadive (lāk'a-dīv) Islands, group of 14 coral islands in Arabian Sea 200 mi. w. of S. India; 80 sq. mi.; pop. 18,393; group belongs to India; map A-407

Laccolith (lāk'ō-līth), in geology, diagram G-49

Devils Tower, Wyoming N-33, map N-18, picture W-321

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Jacquard apparatus F-7, L-77, pictures L-80-1

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Lace-bark tree, tree of the West Indies (*Lagetta linearis*) remarkable for its inner bark of interlacing fibers resembling coarse lace; used for collars, frills; also for making whips and rope.

Lacedæmon (lās-dē-mōn'), the ancient name of Laconia, in Greece, country of which Sparta was capital S-329

La Ceiba, Honduras, Caribbean port city; pop. 16,645; distributing center for bananas, hides, fruits; map N-251

Lacertilla (lās-ēr-tī'l-i-ā), suborder of reptiles comprising lizards L-284

Lace verbena. See in Index Zaluzlansky

Lacewing fly. See in Index Green lacewings

Lacey Act of 1900, U. S., on mongoose importation M-346

Lachaise (lā-shēz'), Gaston (1882-1935), sculptor, born Paris, France; in U. S. after 1906; best known for

monumental female figures modeled in large, simple planes: S-81

La Chaux de Fonds, Switzerland. See in Index Chaux de Fonds, La.

Lachesis (lāk'ē-sis'), one of Fates F-44

Lachine (lā-shēn'), Quebec, Canada, manufacturing town and summer resort on Lake St. Louis connected with Montreal 8 mi. n.e. by Lachine Canal; pop. 27,773; water trade; steel plant. Burned and inhabitants massacred by Indians 1689; maps C-72, inset C-69, picture C-107

Lachine Rapids, in St. Lawrence River S-19

Lachish (lā'kīsh'), ancient city in S. Palestine, often mentioned in Tell el-Amarna tablets and in Bible; destroyed by Joshua (Josh. x, 31-3) and assigned to tribe of Judah (Josh. xv, 39).

Lachlan River, in New South Wales, Australia; joins Murrumbidgee River near junction with Murray River; 700 mi. long; map A-489

Lachrymal, or lacrimal (lāk'ri-māl) glands, the tear-secreting organs at upper and outer part of eye cavity E-462

Lachrymator, or lacrimator, a tear gas C-208

Lac Insect L-82

Lackawanna, N. Y., industrial and railroad city on Lackawanna River 6 mi. from Buffalo; pop. 27,658; large steel plant; map N-204

Lackawanna River, in n.e. Pennsylvania; flows about 35 mi. s.w. to Susquehanna River.

Lackland, nickname for King John of England J-358

Laclede (lā-klēd'), Pierre (1724-78), also called Pierre Laclede Liguest, American fur trader and founder of St. Louis, Mo.; born in Lower Pyrenees, France; emigrated to New Orleans 1755 and established a fur trade with the Indians of the Missouri River area; 1764 founded trading post on present site of St. Louis.

Laclede's Village, old French town on site of St. Louis, Mo. S-22

Lacombe, Albert (1827-1916), Canadian Roman Catholic missionary, born St. Sulpice, Lower Canada; one of first missionaries sent to Northwest Territories; author of grammar and dictionary of Cree Indian language.

La Condamine (lā kōn-dā-mēn'), Charles Marie de (1701-74), French scientist, born Paris; explored the Amazon: R-241

Lacouia (lā-kō'ni-ā), in ancient Greece, s.e. district of Peloponneseus of which Sparta was the capital S-329, map G-197

origin of 'laconic' S-329

Sparta conquers G-197

Laconia, N. H., summer resort and industrial city on Winnepesaukee River 28 mi. n. of Concord in beautiful lake region; pop. 14,745; knitting machines, hosiery, needles, brass and iron castings; map N-151

La Coruña, Spain. See in Index Coruña, La

Lacquer (lāk'ēr) L-81-2, P-41

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Lacquer enamels L-82

Lacquer ware L-81-2, C-278, picture J-318

Lacrimal. See in Index Lachrymal

Lacrimal bone, a small bone within orbit of eye S-192

La Crosse (la kros'), Wis., manufacturing and trade center on Mississippi River 120 mi. s.e. of St. Paul, Minn.; pop. 47,535; center of stock-raising and dairying region and tobacco market; rubber boots and

shoes, machine-shop products, air-conditioning and heating equipment, agricultural machinery; Wisconsin State College; maps W-173, U-253

Lacrosse, a game L-82-4, pictures L-82-3

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Lac (lāk) sulfur, or milk of sulfur S-448

Lactarius pergameniis, or parchment lactarius, a mushroom, color picture M-456

Lact'rius, any one of lymphatic vessels of intestinal canal B-209, P-244-5

Lactic acid, the acid formed in sour milk; chemical composition C₃H₅O₂

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muscle action develops B-146, R-118

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Lactobacillus (lāk-tō-bā-sil'ūs), a bacterium which makes lactic acid B-15

Lactose, or milk sugar, a double (disaccharide) sugar (C₁₂H₂₂O₁₁), reducible to galactose and glucose; differs from maltose and sucrose in structure of molecule; about one-sixth as sweet as cane sugar: M-252, S-446

use in medicine M-253

Lad'anum, or labdanum, a resin obtained from the plants *Cistus ladaniferus* and *Cistus villosus*; used in manufacture of heavy perfumes.

Ladd, Edwin Fremont (1859-1925), chemist, born Starks, Me.; on faculty of North Dakota Agricultural College 1890-1920; U.S. senator 1921-25; pioneer in pure food legislation.

Ladd, George Trumbull (1842-1921), philosopher, born Painesville, Ohio; one of first to introduce study of experimental psychology into America; founded Yale University psychological laboratory (translation, Lotze's 'Outlines of Philosophy', 6 vols.).

Ladder

fire department F-84, picture F-87

safety measures, pictures S-9, 12

Ladder-back chair I-181, picture I-185

Ladder dredge D-142-3

Ladd-Franklin, Christine (1847-1930), scientist, born Windsor, Conn.; first woman student at Johns Hopkins University and at universities of Göttingen and Berlin in Germany; distinguished career in mathematics, physics, and psychology; famous for her theory of color perception.

Ladies of the Grand Army of the Republic (1886) P-98

Ladies' sorrel. See in Index Sorrel, wood

Ladies tresses, a wild flower of the genus *Spiranthes* of the orchid family; the flowers are small, white, yellowish- or greenish-white, in twisted spikes.

Lading, bill of. See in Index Bill of lading

Ladino (lā-dē'nō), a person of mixed Spanish and Indian blood C-173. See also in Index Mestizo

Ladislaus (lād'is-lous), common form of Laszlo' (lās'is) I, Saint (1040-95), king of Hungary; obtained Croatia for Hungary and Christianized it; most beloved of Hungarian kings; canonized 1198; festival June 27.

Ladoga (lā'dō-gā), Lake, largest lake of Europe, in n.w. Russia; area about 7000 sq. mi.: L-84, maps R-259, 266, E-417, 419

Ladrone Islands. See in Index Mariana Islands

Lady, title D-43

- Ladybug, ladybird, or lady beetle, a small spotted beetle L-84, picture N-53, color pictures I-154d hibernation H-352
preys upon: aphids A-273, picture I-164; potato bugs P-392; scale insects S-53, 54
- Lady Godiva (*gō-dī'vā*) (11th century), legendary English heroine C-502
- Lady Jane Grey (1537-1554), nine-day queen of England G-215
- Lady of Christ's (Milton) M-257
- Lady of the Lake, water fairy and enchantress of Arthurian legend; treacherously imprisoned Merlin in an enchanted tower in the forest of Brécéliande; reared Lancelot in her palace, situated in the middle of an imaginary lake
- King Arthur's sword A-393
- 'Lady of the Lake, The', poem by Sir Walter Scott S-67
- Ladysmith, Union of South Africa, trade center, and railroad junction in N. Natal; pop. 16,317; besieged by Boers for 118 days (1899-1900) during Boer War: E-220, maps S-242, A-47
- Roberts raises siege R-163. See also in Index Siege, table
- Lady's-slipper, a plant of the orchid type L-84, picture L-84, color picture F-178
- skin irritant P-339
- state flower of Minnesota M-281, color picture S-384a
- Lae, port on e. coast of northeast New Guinea; pop. 4146; capital of Territory of New Guinea 1941-42; occupied by Japanese 1942-43; re-occupied by Allies Sept. 1943: maps E-203, P-16
- Laënnec (*lā-ā'nēk*), René Théophile Hyacinthe (1781-1826), French physician, born Brittany; invented the stethoscope and began practice of auscultation in medicine.
- Laertes (*lā-ēr'tēz*), father of Odysseus O-345
- Laertes, in Shakespeare's 'Hamlet', son of Polonius H-254
- Laevorotation, or levulorotation, rotation of plane-polarized light to the left T-21, L-235
- tartaric acid T-21
- La Farge (*lā fārg*), John (1825-1910), painter, mural decorator, and designer of first stained glass made in U.S.; born New York City; grandfather of Oliver La Farge; exercised great influence on American art (lunettes, Supreme Court room, Minnesota State Capitol; 'Battle Window', Memorial Hall, Harvard University): B-258
- La Farge, Oliver (born 1901), writer, born New York City, grandson of John La Farge; graduated Harvard University; made archaeological and ethnological expeditions to Arizona for Harvard University and to Guatemala and Mexico for Tulane University; writes with intimate knowledge and understanding of the Indians ('Tribes and Temples'; 'North Is Black', short story; 'Laughing Boy', novel, won Pulitzer prize 1920).
- Lafayette (*lā-fī-ē'*, French *lā-fā-yēt'*), George Washington Motier de (1779-1849), son of Marquis de Lafayette; aide-de-camp to General Grouchy
- Guest of Washington W-25
- Lafayette, Gilbert Motier de (1757-1824), French general and patriot L-85-6, picture L-85
- Bartholdi's sculptures B-61
- De Kalb and D-46-7
- lays cornerstone of Bunker Hill monument B-352
- part in American Revolution L-85
- Pershing visits tomb W-237
- son named for Washington W-25
- Lafayette, Marie Madeleine, comtesse de (1634-93), French novelist; her masterpiece, 'La Princesse de Clèves', is first modern novel of sentiment in which story's interest depends not on the incident but on the character of persons involved.
- Lafayette, Ind., city in agricultural region 60 mi. n.w. of Indianapolis; pop. 35,568; railroad shops; makes iron and aluminum products, box board, and paper products; Purdue University at West Lafayette: maps I-78, U-253
- Lafayette, La., city 115 mi. n.w. of New Orleans; pop. 33,541; lumber, cotton, sugar; Southwestern Louisiana Institute: map L-330
- Lafayette, fish. See in Index Spot
- 'Lafayette, we are here' W-237
- Lafayette College, at Easton, Pa.; Presbyterian; for men; opened 1832 (chartered 1826); arts and sciences, economics, engineering, international affairs; graduate studies.
- Lafayette National Park, former name of Acadia National Park N-30, map N-18
- Lafayette Square, Washington, D.C., public park north of the White House; contains statues of Generals Andrew Jackson, Lafayette, Kosciuszko, and Steuben: map W-30
- statue of Lafayette, picture L-85
- La Fère (*lā fēr*), France, town on Oise River 15 mi. n.w. of Laon; pop. 2462; scene of fighting in World War I and again in World War II: map W-217
- Lafitte (*lā-fē'*), Jean (1780?-1826?), American pirate, slave-trader, and smuggler, born France L-86, picture L-86
- La Follette (*lā fōl'ēt*), Philip F. (ox) (born 1897), lawyer and political leader, born Madison, Wis.; son of Robert Marion La Follette; Progressive Republican; governor of Wisconsin 1931-33, 1935-39.
- La Follette, Robert Marion (1855-1925), political leader, born Primrose, Wis.; known as "Fighting Bob"; father of Philip F. and Robert M. La Follette; governor of Wisconsin 1901-5; U.S. senator 1905-25; a Progressive Republican who subordinated party ties to his own principles; opposed U.S. entrance into World War I; many of the reforms he sought incorporated in "Wisconsin Idea"; Independent presidential candidate 1924
- heads Progressives P-360: electoral vote, chart P-409
- opposes Taft T-4
- Seamen's Act S-161
- Statuary Hall. See in Index Statuary Hall (Wisconsin), table
- La Follette, Robert Marion (1895-1953), political leader, born Madison, Wis.; son of Robert Marion La Follette; Progressive Republican; U.S. senator from Wisconsin 1925-47; committed suicide.
- La Fontaine (*lā fōn-tān'*), Jean de (1621-95), French poet and fabulist L-86-7
- table F-2
- 'Monkey and the Cat' F-2, 3, picture F-1
- 'Panchatantra' source of tales S-405
- La Fontaine, Sir Louis Hippolyte (1807-64), Canadian jurist and statesman, premier 1842-44 and 1848-51; chief justice of Lower Canada 1853-64: C-98, B-20
- La'orgue (*lā-fōrg'*), Jules (1860-87), French symbolist poet, born Montevideo, Uruguay; one of first to write modern free verse.
- Lag'ado, in 'Gulliver's Travels', the capital of Balnibarbi; here a celebrated Academy of Projectors engages in extracting sunbeams from cucumbers, in converting ice into gunpowder, and in similar ridiculous ventures: picture G-229
- Lagash', ancient city-state in Babylonia, one of oldest centers of Sumerian civilization, map B-6
- Gudea, ruler, pictures B-5, S-75
- Lagerlöf, Selma Ottilliana Lovisa (1858-1940), Swedish writer L-87, S-412
- 'Nils' L-87, L-216, picture L-216b
- Lagomorpha, order of gnawing animals that differ from rodents in having 4 upper cutting teeth (incisors) instead of 2; include hares, rabbits, and pikas.
- Lagoon', a pool or lake, especially one connected with the sea
- coral islands P-9
- harbors formed by H-264
- Lagos (*lā'gōs*), a region (formerly province) of s. Nigeria; in w. Africa; 27,000 sq. mi.; low marshy coast, with countless lagoons; forested interior yields palm oil and kernels, mahogany, rubber; chief cities Ibadan (including surrounding suburban farm district 227,284) and Lagos: N-236a, map A-46
- Lagos, capital and chief port of Nigeria, in s.w.; pop. 174,000: N-236, map A-42, picture N-236
- Lagrange (*lā-grānz'h'*), Joseph Louis (1736-1813), French mathematician, one of greatest of 18th century, born Turin, Italy; contributed to verification of Newtonian theory of gravitation.
- La Grange (*lā grānj'*), Ga., industrial city and trade center, 63 mi. s.w. of Atlanta; pop. 25,025; textiles; La Grange College: maps G-76, U-253
- La Grange, Ill., city 12 mi. s.w. of Chicago; pop. 12,002; settled in 1830's; named for Lafayette's home in France; Masonic Orphans Home: map, inset I-36
- La Grange College, at La Grange, Ga.; Methodist; for women; chartered 1831; opened 1832; coeducational for day students; arts and sciences.
- La Granja, Spain. See in Index San Ildefonso
- La Guaira (*lā gwī'rā*), Venezuela, leading seaport, on n. coast; artificial inner harbor; pop. 16,279: V-441, map S-252, picture V-443
- tunnel. See in Index Tunnel, table
- La Guardia (*lā gwār'dī-ā*), Fiorello H. (1882-1947), lawyer and public official, born New York City; member of U.S. Congress 1917-21, 1923-33; mayor of New York City 1934-45; director UNRRA 1946.
- La Guardia Field, airport, New York City N-224, picture A-533
- Laguna (*lā-gō'nā*) (Spanish "lagoon"), a pueblo about 40 mi. w. of Albuquerque, N. M.; established 1699; Laguna people belong to the Keresan language group of Pueblo Indians: map N-178
- Laguna Beach, Calif., town 45 mi. e. of Los Angeles; pop. 6661: map C-35, picture U-305
- Lahaina (*lā-hī'nā*), Hawaiian Islands, city on w. coast of Maui; pop. 4025: H-288-288a, map H-288
- La Halle, Adam de. See in Index Adam de la Halle
- La Harpe (*lā ār'p*), Bernard, sieur de, French explorer in America A-369
- Lahn River, Germany, after s.w. course of 135 mi. joins Rhine opposite Cöln.
- La Hogue (*lā hōg'*, French *lā of'*), or La Hougue, battle of, fought 1692 near n.e. extremity of peninsula of

Cotentin, Normandy, France; English and Dutch fleets under Admiral Russell defeated French fleet under Tourville: J-293

Lahontan (*la-hôn'tan*), Lake, Nevada N-124

Lahontan Dam, in Nevada, on Carson River, *picture* I-252

Lahore (*la-hôr'*), capital and largest city of Punjab province, west Pakistan, near Ravi River; pop. 849,476; transportation center; silk and cotton cloths, carpets, vegetable oils; Punjab University: *maps* I-54, A-406

Lai (*li*), a medieval short tale of the Franklin's, in Chaucer's 'Canterbury Tales' C-204

Laibach, Yugoslavia. *See in Index* Ljubljana

Laid paper, paper marked with parallel lines
postage stamps S-363

L'Aiglon (*lê-glôn'*), poetic name meaning "eaglet" given by Victor Hugo to duke of Reichstadt, son of Napoleon and Marie Louise; subject of play by Rostand

Sarah Bernhardt plays, *picture* D-134

Laird, David (1833-1914), Canadian journalist and statesman, born New Glasgow, P.E.I.; 1873 elected to Canadian House of Commons; 1873-76 minister of the interior; 1876 lieutenant governor of North-west Territories.

Lnissez faire (*lâ-sâ fêr'*) ("let it be"), the 18th-century (French) way of saying "less government in business"; in contemporary use means unrestricted industrial and commercial competition: I-130, 133

La'ity, defined C-302

La'ius, in Greek mythology, father of Oedipus O-345

La Jolla (*la hô'ya* or *la hoi'a*), Calif., suburb in city of San Diego; pop. 13,000; Scripps Institution of Oceanography: *picture* S-40

La Jonquière, Jacques Pierre Taffanel, marquis de (1680-1753), French naval officer, born near Albi in s. France; fought numerous engagements against British; governor of New France (Canada) 1749-53.

'La Juive' (*là zhü'év*) ('The Jew-ess'), opera by Halévy
story O-390

Ln Junta (*la hün'ta*), Colo., city on Arkansas River 60 mi. s.e. of Pueblo; pop. 7712; railroad shops, food processing, livestock sales center: *maps* C-409, U-252

Lake, Simon (1866-1945), naval architect and mechanical engineer, born Pleasantville, N.J.; inventor of even-keel type of submarine: S-437

Lake L-87, E-181. For list of greatest lakes, *see table* on this page. *See also in Index* names of individual lakes, as Erie, Lake

climate affected by G-180
drained, effect on drought and floods F-146

extinct: Agassiz M-78; Bonneville F-185; borax deposits B-262; potassium salt deposits P-389-90
fresh-water: deepest in world B-18; largest S-467, L-87

glacial origin I-4, L-87
largest inland body of water L-87
salt E-181, L-87; Caspian Sea largest C-132; Dead Sea P-44-5; Great Salt Lake G-185; Owens Lake D-152; potassium salts left by evaporated lakes P-389-90

shore line changes aid drought studies D-152

tides T-131
water table and G-179-80

Lake Charles, La., commercial and

manufacturing city on Lake Charles, 185 mi. w. of New Orleans; channel to Gulf; pop. 41,272; oil fields near; lubricating oil refinery: *maps* L-330, U-253

Lake District, in n.w. England; has all principal English lakes: E-346, 348, *map* B-321

home of Wordsworth, *picture* W-198
Lake dwellers, Stone Age people who built huts on pile foundations along the shores of lakes L-87, M-66, D-153, S-144, S-481, *picture* S-144a, color *picture* M-68

bread B-294

weaving T-104

Lake Erie, battle of (1813) P-153, W-13

Lake Erie College, at Painesville, Ohio; for women; chartered 1856; opened 1859; arts and sciences.

Lake Forest College, at Lake Forest, Ill.; Presbyterian; founded 1857 as Lind University; arts and sciences.

WORLD'S GREATEST LAKES

NAME	AREA IN Sq. Mi.
Caspian Sea.....	168,500
Superior.....	31,820
Victoria.....	26,000
Aral.....	25,100
Huron.....	23,010
Michigan.....	22,400
Nyasa.....	14,000
Baikal.....	13,200
Tanganyika.....	12,700
Great Bear.....	11,500
Great Slave.....	11,200
Tchad.....	10,000
Erie.....	9,940

Lake Geneva, Wis., city in s. Wisconsin about 65 mi. n.w. of Chicago, Ill.; resort; on Lake Geneva; pop. 4300; Yerkes Observatory of University of Chicago, 6 mi. w. of city: *map* W-173

Lake herring, or cisco W-121

Lakelhurst, N.J., village about 55 mi. s. of New York City; pop. 1518; naval air station for lighter-than-air training and experimental projects: *map* N-165

Lakeland, Fla., city about 30 mi. e. of Tampa; pop. 30,851; 12 lakes; phosphate, citrus fruit, cattle; manufacture of canning and packing machinery; Florida Southern College; National Home of Carpenters and Joiners of America: *maps* F-158, U-253

Lakeland terrier, dog, native of Lake District of England, *table* D-118b

Lake Mead National Recreation Area, in Arizona and Nevada N-38d, C-414b-15, *maps* N-18, C-414b, *picture* C-414a

Lake of the Woods, an island-dotted body of water of n. Minnesota and adjacent parts of Ontario, Canada; 1485 sq. mi.; 105 mi. long: *maps* M-278, 286, U-286, C-81
muskellunge fishing P-256

Lake Placid, N.Y., village at s. end of Lake Placid (about 4 mi. long and ½ mi. wide); pop. 2999; a famous winter and summer resort in Adirondack Mts.; nearby is the grave of John Brown, the abolitionist: A-21, *map* N-205, *picture* N-207

Lake Poets, a group of poets—Coleridge, Wordsworth, and Southey—who lived in the Lake District of northern England C-381

Lake Regillus, battle of (496 B.C.) R-182

Lakes-to-Gulf waterway G-183, R-157, C-109, *map* G-179, *picture* I-40

Illinois Waterway links I-30, C-231
Lake Success, on Long Island, N. Y.; pop. 1264: *map*, *inset* N-204

United Nations Security Council headquarters U-240b

Lake trout T-193, color *picture* F-118
lamprey an enemy L-88

Lnke Washington Floating Bridge, in Washington B-308, *picture* S-93.
See also in Index Bridge, table

Lakewood, Ohio, city on Lake Erie, just w. of Cleveland; chiefly residential; pop. 68,071: *map*, *inset* O-357

Lake Worth, Fla., city 9 mi. s. of Palm Beach, on Atlantic; resort; pop. 11,777: *map* F-159

Laki, Mount, volcano in Iceland I-10

Lalande (*lâ-lând'*), Saint John (died 1646), Roman Catholic martyr; missionary in Canada and New York; companion of Father Jogues; murdered by Mohawks at Ossernenon, N.Y.; canonized 1930; commemorated as a saint Sept. 26 or (by Jesuits) March 16.

Lalande, Joseph Jérôme Le François de (1732-1807), French astronomer; professor Collège de France, director Paris observatory; popularized astronomy; established annual Prix Lalande for most useful work on astronomy.

Lalemant, Gabriel (1610-49), Canadian Jesuit missionary, born Paris, France; came to Canada 1646; worked with Father Brebeuf among the Huron Indians and was killed by the Iroquois.

Lalloue (*lâ-lêk'*), René (1860-1945), French jeweler, famous for carving in jewels and glass.

'Lalla Rookh' (*lâ'lä rgk*), Oriental poem by Thomas Moore; an Indian princess, on her way to Sultan Aliris, her betrothed, is entertained by a Persian poet, with whom she falls in love; is later overjoyed to find that the poet was her betrothed in disguise
scene of, *picture* R-156

'L'Allegro' (*lâ-lâ-grô*) ("the happy man"), poem by John Milton; companion poem of 'Il Penseroso'; describes quiet pleasures of a contented man
quoted H-326

Lallemantia, a biennial plant (*Lallemantia canescens*) of the mint family, native to w. Asia. Grows to 18 in.; soft hairy leaves; flowers whorled, blue, in 10-in. spikes.

Lalo (*lâ-lô'*), Edouard (1823-92), French composer ('Le Roi d'Ys', opera; 'Symphonie Espagnole', 'Norwegian Rhapsody', orchestral works).

La'maism, a religion of Tibet and Mongolia T-127-9, M-344, *pictures* T-127, 128

Dalai Lama, or Grand Lama T-129, *picture* T-127: palace, *picture* T-129

La Malbaie, also Murray Bay, Quebec, Canada, town on bay of Murray estuary, about 90 mi. n.e. of Quebec; pop. 2466; summer resort: *map* C-73

Lamar', Lucius Quintus Cincinnatus (1825-93), jurist and statesman, born Putnam County, Ga.; drafted Mississippi ordinance of secession; U.S. senator 1877-85; secretary of interior 1885-88; justice U.S. Supreme Court 1888-93; helped reconciliation between North and South after Civil War.

Lamar, Mirabeau Buonaparte (1798-1859), soldier, born Louisville, Ga.; participated in Texas revolution

Key: cāpe, āt, fār, fāst, whāq, fāll; mē, yēt, fērn, thēre; fce, bīt; rōw, won, fōr, nōt, dō; cūre, būt, rȳde, fūll, bŭrn; out;

- and distinguished self at San Jacinto; president Texas Republic 1838-41; major general Mexican War; U.S. minister to Argentina, Nicaragua, Costa Rica.
- Lamarck** (*lâ-mâr-k'*), Jean Baptiste Pierre Antoine de Monet, chevalier de (1744-1829), French naturalist, who adopted (in 1802) the word "biologie" as name of new science to be devoted to study of all life considered as the same process whether in plants or animals forerunner of Darwin D-19
- Lamartine** (*lâ-mâr-tên'*), Alphonse de (1790-1869), French poet, historian, and statesman ('Meditations'; 'History of the Girondins').
- Lamb, Charles** (1775-1834), English essayist L-87-8
book annotations B-247
essays L-88, E-398
letters L-171
opinion of Samuel T. Coleridge C-382 quoted on Shakespeare S-127
'Tales from Shakespear' S-131, L-273
- Lamb, Mary** (1764-1847), English writer, sister of Charles Lamb L-88
'Tales from Shakespear' S-131, L-273
- Lamb, William**, See in *Index* Melbourne, William Lamb, viscount
- Lamb**, a young sheep S-136, 137
pet, picture P-185
skin used for gloves G-126
wool W-197, S-138
- Lamballe** (*lân-bâl'*), Marie Thérèse de (1749-92), French princess, friend of Marie Antoinette; killed by revolutionists; her head carried past queen's prison windows.
- Lambert, Johann Heinrich** (1728-77), German physicist, mathematician, astronomer, and philosopher; made important contributions to mathematical theory; measured intensity and absorption of light (Lambert unit of intensity named for him) map projections improved M-91
- Lambert, Louis**, See in *Index* Gilmore, Patrick S.
- Lambert, Richard Stanton** (born 1894), Canadian educator and writer, born London, England; promoted educational and cultural films and radio broadcasts; books for children include 'Franklin of the Arctic' (Canadian Book of the Year for Children award 1949) and 'The Adventure of Canadian Painting'; also author of books for adults.
- Lambeth**, borough of London, England; pop. 230,105; L-306
- Lambeth Palace**, in London, England; begun 1207; heavily damaged by bombing 1940-41; L-306
- Lambkill**, or sheep laurel, an evergreen shrub of the heath family; grows to 3 ft.; flowers purple or crimson, in flat-topped clusters; P-339
- Lamb's-ears**, a perennial plant (*Stachys lanata*) of the mint family, native to w. Asia. Grows to 18 in., entire plant white, woolly, with oblong leaves and spikes of tiny, tubular, purple flowers; sometimes called woolly woundwort.
- Lamb's lettuce**, See in *Index* Corn salad
- Lamb's quarters**, or goosefoot, an annual herb (*Chenopodium album*) of the goosefoot family with clusters of small greenish flowers and leaves shaped like the foot of a goose; although considered a pest, delicious greens may be made from it.
- Lamb's wool** W-197
- Lamb culture** V-324
- Lamé** (*lâ-mâ'*), a fabric made of silk, wool, or cotton threads wound with thin strips of silver- or gold-plated metal.
- Lame Duck**, or 20th, Amendment H-421, U-348
text U-355
- Lamentations**, book of Old Testament traditionally ascribed to Jeremiah; comprises five dirges bewailing the destruction of Jerusalem.
- Lamenting bird**. See in *Index* Limpkin
- La Mesa, Calif.**, city 8 mi. n.e. of San Diego; pop. 10,946; farming: map C-35
- Lamesa, Tex.**, city 57 mi. s.w. of Lubbock; pop. 10,704; cotton and other farming; poultry; oil fields; cotton gins; garments: map T-90
- Lamia** (*lâ'mi-â'*), in Greek mythology, a beautiful vampire; in John Keats's poem 'Lamia', a serpent that assumes human form to win a man's love.
- Laminating**, arranged or made in thin layers (laminae)
bows, in archery A-303
plastics P-313
plywood P-327
safety glass G-122
- Lammerglacier** (*lâm'êr-gî-êr*), or bearded culture V-524
- Lamoille** River, in n. Vermont; cuts Green Mts.; flows into Lake Champlain: maps V-457, N-144
- Lamon** (*lâ-môn'*), Ward Hill (1828-93), law partner, secretary, and biographer of Abraham Lincoln, picture C-332
- Lamont, Daniel Scott** (1851-1905), political leader, born Cortlandville, N. Y.; private secretary to President Cleveland; secretary of war in Cleveland's Cabinet 1892-96; vice-president Northern Pacific R.R.
- Lamont, Robert Patterson** (1867-1948), U.S. secretary of commerce under President Hoover; born Detroit, Mich.; engineer and manufacturer; president American Steel Foundries 1912-29.
- La Motte-Fouqué** (*lô-kâ'*), Friedrich, baron de (1777-1843), German romantic poet and novelist, born Brandenburg; extremely popular in early 19th century ('Undine').
- Lampblack**, or carbon black, a form of carbon G-33, C-120
ink I-150, C-385
pencils P-116
tire manufacture G-33, R-239
- Lamp-eyed fish**, has an organ below each eye in which bacteria live; the bacteria secrete a luminous chemical; the fish may draw a lid over the organ when it wishes: F-106
- Lampman, Archibald** (1861-99), Canadian poet C-106
- Lamprey**, an eel-shaped fish L-88, picture P-78
evolutionary position F-108
migration, picture M-244
- Lamps** L-88-90, L-238, pictures L-89-90. See also in *Index* Light; Lighting
- arc lamp** E-309; miscel metal used A-174; motion-picture projector, diagrams S-392, pictures M-424, 425
- Argand burner** L-89
candles L-89-90
colonial, pictures L-89, 90, I-185
electric lamp E-310-11, T-206, pictures E-310, 311, I-199
fire prevention F-90
fluorescent E-311, E-314, E-318, pictures L-239
gas lamps G-30-1
glow lamp (neon type) E-314, E-318
Greece, ancient L-88, pictures G-201, L-89
interior decoration I-184-5, picture I-176
lanterns L-89, pictures L-89, 90
- lighthouse** L-236, pictures L-237
measuring light given L-228-9
miner's safety lamps D-23, picture E-236; mischmetal flints A-174
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Rome, ancient L-88, picture L-89
signaling S-179, L-89
sodium vapor lamps S-226
- Lamp'sacus**, ancient Greek city of Mysia, Asia Minor, on Hellespont, opposite Gallipoli.
- Lamp shell**. See in *Index* Brachlopoda
- Län** (*lân*), administrative district in Sweden S-465
- Lanai** (*lâ-nâ'ê*), one of the Hawaiian Islands; 141 sq. mi.; pop. 3136; highest point 3400 ft.; pineapple plantations: H-288a, maps H-286, P-17
- La Navidad**, in Haiti; Columbus' first settlement in New World: C-418b, 419, H-245
- Lancashire** (*lân'kâ-shêr*), or Lancaster, county of n.w. England; 1875 sq. mi.; pop. 5,116,013; cap. Lancaster; iron and coal mines; textiles, machinery: L-91, E-354, map E-347
textile industry M-71, L-278
- Lancaster, John** of Gaunt, duke of. See in *Index* John of Gaunt
- Lancaster, England**, capital of Lancashire, on Lune River, 7 mi. from sea; pop. 51,650; was ancient Roman station: L-91, map B-325
- Lancaster, Ohio**, farming center and manufacturing city on Hocking River, 28 mi. s. of Columbus; pop. 24,180; glassware, shoes, foundry products; state industrial school for boys nearby: map O-357
- Lancaster, Pa.**, city 34 mi. s.e. of Harrisburg; pop. 63,774; agricultural market and stockyards; linoleum, watches, television tubes, metal products, textiles; Franklin and Marshall College: maps P-133, U-253
first variety chain store C-181
former state capital P-139
- Lancaster, House of**, famous English royal family L-91. See also in *Index* Roses, Wars of the
founded by Henry IV H-336
list of rulers. See in *Index* England, subhead kings and queens, table
- Lancaster Turnpike**, historical road in U. S. R-158b, P-124, map R-159
- Lance**, long-shafted cavalry weapon with spearhead, more important in medieval than in modern times.
- Lancelet**. See in *Index* Amphioxus
- Lancelot** (*lân'sê-lôt*) of the Lake, or Launcelot, in Arthurian legend, the bravest and most famous of the Knights of the Round Table; outstanding figure in Tennyson's 'Idylls of the King': picture L-216c
quest for Grail G-1
- Lancers**, a type of quadrille; introduced in 19th century; danced by 8 or 16 couples; also its music. See also in *Index* Quadrille
- Lancewood**, name given to several trees of family *Anonaceae* native to West Indies and Guiana, and to their highly pliable and tough even-grained wood, which is used for fishing rods and for other articles requiring flexibility and strength.
- Lanciani** (*lân-chû-nê*), Rodolfo (1846-1929), Italian archaeologist; professor ancient topography University of Rome; made important dis-

- coveries at Ostia, Tivoli, Rome ('Ancient and Modern Rome').
- Lancrer** (*län-kre'*). Nicolas (1690-1743). French painter, born Paris; greatly influenced by Jean Antoine Watteau; gay portrayals of French society.
- Land**, Edwin Herbert (born 1909), inventor and corporation executive, born Bridgeport, Conn.; began development of light polarization as an applied science; invented polaroid camera; adviser on guided missiles to U.S. Navy.
- Land**, Emory S(cott) (born 1879), U.S. Navy officer, born Canon City, Colo.; chairman U.S. Maritime Commission 1938-46; chief of War Shipping Administration 1942-46; president Air Transport Association of America since 1946.
- Land**. See also in *Index* Agriculture; Conservation, *subhead* soil; Eminent domain; Irrigation and reclamation; Land grants; Lands, public; Land tenure; Land use description of townships, sections, and quarters, *diagram* L-92 earth's surface O-328, *table* E-180 farm lands, in U.S. U-316 homestead L-92, J-358, I-46 speculation P-265-6 survey S-457-8. See also in *Index* Surveying taxation T-24a world distribution of cultivated lands, *graphs* A-71, *map* A-71
- Land Acts** of 1870, 1881, Ireland I-230a
- Land banks**, federal (U.S.) F-20
- Land bridges** between continents. See in *Index* Geology, *subhead* land bridges between continents
- Lander College**, at Greenwood, S. C.; founded 1872; arts and sciences, education.
- Landes** (*län'd*), region of s.w. France, vast tract of sandy marshland bordered by dunes
- reclamation** S-38
- "Land flowing with milk and honey," from Bible, Exod. iii, 8 and Jer. xxxii, 22.
- Land grants**
- agricultural education A-64, E-256, U-403
- educational grants in U.S. E-256, 257, L-92, S-58; South Dakota S-306-7; Texas T-97
- Morrill Act, 1862 A-64, E-256, U-403
- railroads N-293, L-91, R-60
- Landi Khana**, British-built fort on Afghanistan frontier, *picture* A-31
- Landing craft**, in warfare N-88-9, *picture* N-93
- Landing gear**, in airplane, *diagrams* A-87, 96, *picture* A-98
- Landing light**, in airplane, *diagram* A-96
- Landing net**, in fishing, *list* F-118h
- Landis**, James McCauley (born 1899), public official, born Tokyo, Japan, of American parents, missionaries; taught law, Harvard University, 1926-34; chairman SEC 1935-37; dean Harvard Law School 1937-46; director Office of Civilian Defense 1942-43; director U.S. economic operations in Middle East 1943-45; chairman Civil Aeronautics Board 1946-47.
- Landis**, Kenesaw Mountain (1866-1944), jurist and baseball commissioner, born Millville, Ohio; judge U.S. district court of n. Illinois 1905-22; tried Standard Oil rebate case 1907. See also in *Index* Baseball Hall of Fame, *table*
- high commissioner of baseball B-72
- Land League**, Irish I-230a, B-272
- Landlord**, owner or master of land or of building rented to tenants
- cotton farms C-495
- feudal system F-60, 61
- Land Management**, Bureau of, U. S. L-92, U-363
- Land mensur**, units of, *table* W-87
- Land of Enchantment**, popular name for New Mexico.
- Land Office**, General, U.S. See in *Index* General Land Office, U.S.
- Land of Morning Calm**, Korea K-64a
- Land of Nod**, term used to designate the state of sleep; so called from the unknown land of "wandering," or Nod, to which Cain fled after the murder of Abel (Gen. iv).
- Land of the Five Rivers**. See in *Index* Punjab
- Land of the Maple Leaf**, Canada C-65
- Land of the Midnight Sun**, Norway N-300
- Land of the Pure**. See in *Index* Pakistan
- London**, Alfred Mossman (born 1887), political leader, born West Middlesex, Pa.; governor of Kansas 1933-37; Republican candidate for presidency 1936: R-209
- Land'or**, Walter Savage (1775-1864), English author; a poet of distinction, also master of English prose style (poetry: 'Gebir', 'Rose Aylmer'; prose: 'Pericles and Aspasia', 'Imaginary Conversations').
- Landowska** (*län-döf'skä*), Wanda (born 1877), Polish harpsichordist; authority on early music; came to the United States 1941.
- Land patent** L-92
- Lands**, public L-91-2, *map* L-91. See also in *Index* National parks and monuments
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- slave states oppose policy C-330
- Landscape architecture** A-4007
- Landscape gardening** G-14-15, 17
- Land'seer**, Sir Edwin Henry (1802-73), English animal painter L-93
- artist and his dogs, *picture* L-93
- Land's End**, or Lands End, promontory of Cornwall, forming westernmost point of England, *maps* B-321, 325, *picture* G-174
- Landsgemeinden**, in Switzerland S-481
- Landshut** (*län'ts'hut*), Germany, quaint old town on Isar River in Bavaria, 35 mi. n.e. of Munich; pop. 46,785; Napoleon defeated Austrians (1809): *map* E-425
- Land'steiner**, Karl (1868-1943), American bacteriologist and pathologist, born Vienna, Austria; member Rockefeller Institute for Medical Research; won Nobel prize in medicine 1930 for work in classifying different types of human blood.
- Landsting** (from Norse *land*, "land", and *ting*, or *thing*, "parliament"), certain legislative bodies in Scandinavian countries; in Sweden, county councils.
- Land tenure**. See also in *Index* Eminent domain; Land grants; Lands, public
- American Colonies V-489
- American pioneers P-270
- Argentina A-331
- Aztecs A-544
- California C-40
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- feudal system F-60, 61, *picture* M-238
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- Latin America L-112: Brazil B-290; Central America C-174, 177; Chile C-255; Ecuador E-231; Mexico M-200, L-119, 120
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- Russia R-264, 269, 281
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- Land use** L-93-7, G-40-2, S-231, *diagram* L-97, *graph* L-95, *map* L-94. See also in *Index* Soil
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- distribution in U. S. U-310, *graph* L-95
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- United States U-316, *graph* L-95: farms in A-69. See also Fact
- Summary with each state article
- world distribution of cultivated lands, *graphs* A-71, *map* A-71
- Lane**, Edward William (1801-76), English Arabic scholar; spent many years between 1825 and 1849 in Egypt; published 'Account of the Manners and Customs of the Modern Egyptians'
- 'Arabian Nights' A-292, 293
- Lane**, Joseph (1801-81), statesman and general, born Buncombe Co., N.C.; settled in Vanderburg Co., Ind., 1820; Indiana senator 1844-46; made major general for heroic action in Mexican War; governor of Territory of Oregon 1848-50; Oregon delegate to Congress 1850-58, U.S. senator 1859-61; candidate for vice-president on secession ticket 1860.
- Lane**, Ralph Norman Angell. See in *Index* Angell, Sir Norman
- Lane**, Sir William Arbuthnot (1856-1943), English physician; consulting surgeon Guy's Hospital, Hospital for Sick Children, French Hospital, London; author books on operative treatment of fractures and of cleft palate.
- Lane College**, at Jackson, Tenn.; founded 1882 by Colored Methodist Episcopal church; arts and sciences.
- Lann'franc** (1005?-1089), English prelate and scholar, born in Italy;

Key: cäpe, ät, fär, fäst, what, fäil; mä, yét, fêrn, thêre; ice, bít; röv, wón, fór, nóf, dö; cäre, büf, ryde, füll, bärn; out;

- archbishop of Canterbury 1070-89; as chief counselor of William the Conqueror played important part in fixing Norman rule upon English church and people.
- Lang, Andrew (1844-1912), British scholar, poet, and writer on many subjects ('Ballads in Blue China'; 'Custom and Myth'; 'History of Scotland'; 'Blue', 'Red', 'Yellow', and other fairy books) 'Arabian Nights' S-409 illustrations for his books, *pictures* S-409, 412
- Lang, Cosmo Gordon (1864-1945), English divine, archbishop of Canterbury 1928-42; canon of St. Paul's 1901-8; archbishop of York 1908-28.
- Langdell, Christopher Columbus (1826-1906), lawyer and educator; born New Boston, N.H.; after 1870 dean of Harvard University Law School; introduced "case system" of teaching, which revolutionized methods of law schools.
- Langdon, John (1741-1819), merchant and political leader, born Portsmouth, N. H.; an ardent supporter of the Revolution, he financed Stark's expedition against Burgoyne and built ships for Navy; signed United States Constitution; one of first senators from New Hampshire; governor of New Hampshire 1805-8, 1810-11.
- Langensalza (läng'ën-zäl't'sü), Germany, town on river Salza, n.w. of Erfurt; Hanoverians defeated Prussians in 1866, but surrendered on arrival of Prussian reinforcements.
- Langerhans, Islands of, in pancreas, discovered by Paul L. Langerhans, German pathologist (1849-88) H-426
- insulin discovery B-53
- Langford, Nathaniel Pitt (1832-1911), public official and explorer, born Westmoreland, N.Y.; vigilante in Montana; explored Yellowstone region (1870), and was its first superintendent after it became a national park; wrote 'Vigilante Days and Ways'; N-19
- Langland, William (1330?-1400?), English poet E-376
- Langley, Samuel Pierpont (1834-1906), American physicist, astronomer, and inventor L-97, A-101-2, *picture* L-97
- Langley Air Force Base, Hampton, Va. N-242b, *map* V-487
- Langmuir, Irving (born 1881), chemist, born Brooklyn, N.Y.; engaged in research for General Electric Company 1909-50; invented gas-filled tungsten lamp and condensation vacuum pump; helped develop high-vacuum power tube at atomic hydrogen welding; won 1932 Nobel prize in chemistry ('Atoms and Molecules')
- Pupin teaches P-439
- Langobards. *See in Index* Lombards
- Langres (läng'grä), ancient town in e. France on "Plateau of Langres"; pop. 5624; makes cutlery; famous strategic point since Roman days; *map* E-425
- Langshan, a breed of poultry P-402b, *picture* P-402a
- Langston University, at Langston, Okla.; state control; founded 1897; arts and sciences, agriculture, education, home economics, mechanic arts, trades.
- Langton, Stephen (1150?-1228), English cardinal and archbishop of Canterbury, credited with being first to divide Bible into chapters; agitator for Magna Carta triumphs over King John J-358
- Langtry, Lily (Emily) (1852-1929), English actress, noted for her beauty, born Island of Jersey and known as the "Jersey lily"; first great success in 'She Stoops to Conquer'.
- Language L-98-100, *diagram* L-98a, *Reference-Outline* L-98c-d. *See also in Index* Alphabet; Grammar; Philology; Rhetoric; Writing; and the principal languages and language groups by name
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- American Indians I-106e-8a
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- Eskimo E-396
- Esperanto and Volapük E-397
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- Hawaiian H-289
- Japanese J-312
- Latin once world language L-129
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- Romany, or gypsy G-236
- secret C-240c
- semantics L-98a, C-424g-h
- sign, for deaf D-25
- Language arts L-100-100d, *pictures* L-100a-d
- Languedoc (läng'-gü-dök'), former province in s. France; capital was Toulouse; wine: *map* F-270
- people F-259
- Langue d'oc, French dialect F-286
- Languedoc Canal. *See in Index* Canal du Midi
- Langue d'oïl (läng'-gü dö-öl'), French dialect F-286
- Langulsh, Lydia, a sentimental romantic heiress in Richard Brinsley Sheridan's comedy 'The Rivals'.
- Lanier (lä-nēr'), Sidney (1842-81), American lyric poet L-100d-1, A-228
- Hall of Fame, *table* H-249
- Lanilidae (lä-ni'i-dē), the shrike family of birds.
- Lankester, Sir Edwin Ray (1847-1929), English biologist widely known as a teacher and as a writer of popular works on science; director of Natural History Museum in London 1898-1907 ('Science from an Easy Chair'; 'Secrets of Earth and Sea').
- Lanolin, preparation of purified fat obtained from raw sheep's wool; used as base for various ointments.
- Lansdowne, Henry Charles Keith Petty-Fitzmaurice, 5th marquis of (1845-1927), British statesman; governor general of Canada 1883-88; viceroy of India 1888-93; secretary of foreign affairs 1900-1906, during which time an alliance was made with Japan and friendship cemented with France; leader of Unionist party in House of Lords for several years; favored a moderate peace after World War I.
- Lansdowne, Henry Petty-Fitzmaurice, 3d marquis of (1780-1863), English statesman, chancellor of the exchequer at 25, a Liberal leader and advocate of parliamentary reform and abolition of slavery.
- Lansdowne, Pa., borough, residential suburb about 5 mi. w. of Philadelphia; pop. 12,169; *map*, *inset* P-133
- Lan'sing, Robert (1864-1928), lawyer and authority on international law, born Watertown, N.Y.; counsel for U.S. in Bering Sea and Alaska boundary arbitrations; secretary of state in President Wilson's Cabinet during World War I.
- Lansing, Mich., state capital, on Grand River 80 mi. n.w. of Detroit; pop. 92,129; L-101, *maps* M-227, U-253
- Capitol, State, *picture* M-229
- Lanson, tree of Malaysia (*Lansium domesticum*); bears fruit resembling yellow plum.
- Lanston, Tolbert (1844-1913), inventor, born Troy, Ohio; patented Monotype in 1887; M-361
- Lanta'na, a perennial plant and shrub of verbena family with flat clusters of flowers that turn from pink to orange, then to red, white, or blue, depending upon species; native of tropical America; cultivated for ornament in southern U. S.; introduced also into India, Ceylon, and Hawaii; has become noxious weed in Hawaii, where insects are imported to prey on it.
- Lantern L-89, *pictures* L-89, 90
- colonial, *picture* L-89
- Japanese stone lantern, *picture* J-313
- lighthouse L-236
- magic, early projecting apparatus S-391
- story of Diogenes D-92
- Lantern fish, found in almost all seas; some deep-sea and some not; has luminescent organs in groups; family *Myctophidae*; F-107
- Lanterns, Feast of, in China F-58
- Lanthanide (län'tha-nid) series, of chemicals, *table* P-151
- Lanthanum, a rare earth metal, *tables* P-151, C-214
- Lanuvium (lä-nü'vi-üm) (modern Lanuvio, formerly Civita Lavinia), city of Latium, 19 mi. s.e. of Rome; member Latin League; conquered by Rome 338 B.C.; temple of Juno.
- Laos (lä-ö-üg'), Philippine Islands, seaport on Laoag River near n.w. coast of Luzon; pop. 22,218; rice, indigo, sugar; *maps* P-195, P-16
- Laocöon (lä-ök'-ö-ön), in Greek mythology, Trojan priest of Apollo, warns countrymen against wooden horse; T-192
- statue of G-206
- Laodamia (lä-öä-dä-mi'ä), legendary Greek heroine, wife of Protesilaus; celebrated in William Wordsworth's 'Laodamia'. *See also in Index* Protesilaus
- Laodicea (lä-öä-i-sē'ä), name of several ancient Asiatic cities in realms extending from Aegean Sea to India; Laodicea ad Lycum (modern Denizli, Turkey, 120 mi. s.e. of Smyrna), once wealthy trade center; founded probably 3d century, B.C.; site of one of 7 primitive churches of Asia (Rev. i, 11); Laodicea ad mare (modern Latakia, Syria), pride of the Caesars, noted for ruins of triumphal arch built possibly by Septimius Severus.
- Laoghish (lä'ish), also Leix (lä'ks), formerly Queen's, county in s.e. Ireland, in Leinster Province; 664 sq. mi.; pop. 48,430; farming, dairying, textile manufacturing; county town Port Laoighise (Maryborough); *map* B-325
- 'Laokoon', book by Gotthold Ephraim Lessing (1766), in which the functions of poetry and painting are defined and distinguished; an important book in the history of art.
- Laomedon (lä-öm'-ē-dön), in Greek mythology, founder and king of Troy; father of Priam
- Poseldon aids P-381
- Laon (lä'n), city in France, 80 mi. n.e. of Paris; pop. 14,868; fortified by Romans; Blücher defeated Napoleon at battle of Laon.

- poleon 1814; captured by Germans 1870, 1914, and 1940: *maps* B-111, E-425
recovered by Allies (1918) W-230
Laos (*lā'ōs*), or **Laotians**, a people of Indo-China S-169
Laos, free state in Indo-China; about 82,000 sq. ml.; pop. 1,200,000; cap. Vientiane: I-122-6, *map* I-123
flag F-137, *color picture* F-135
relationships in continent, *maps* A-406-7, 411-12
Lao-tse (*lou'dzū'*) (604?-531? B.C.), Chinese philosopher and metaphysician; contemporary with Confucius; founder of Taoism: *picture* C-277
teachings C-274, R-101
Lap-and-lead lever, in steam engine, *diagram* S-390
La Parida, in Venezuela. *See in Index* Cerro Bolívar
La Pasture, Roger de. *See in Index* Weyden, Roger van der
La Paz (*lā pās*), largest city and seat of government of Bolivia; pop. 321,073: L-101, B-224, *map* S-252, *picture* B-222
La Paz, Mexico, port in Lower California, on Bay of La Paz; pop. 13,081: C-49, *maps* M-189, 194
La Peltre, Marie Madeleine de (1603-71), French Roman Catholic nun, born Alençon; founder of Ursuline convent at Quebec, Canada, 1639; conducted school for Indian and French girls until 1642, when she joined colonists under Maisonneuve and helped to found Montreal, Canada.
La Pérouse (*lā pā-rōs'*), Jean François de Galup, count de (1741-88), French navigator, in war with England took British forts on Hudson Bay 1782; rounded Cape Horn, explored west coast of the Americas, discovered strait of Pérouse between Hokushu and Sakhalin, Japan; lost at sea after reaching Australia, 1788; wreckage of his ships found 1826, on coral reef n. of New Hebrides.
Lapham, Silas. *See in Index* 'Rise of Silas Lapham, The'
Lapis lazuli (*lā'pīs lās'ū-ū*), a semi-precious stone J-350
Afghanistan A-32
Lapithae (*lāp'ī-thē*), in Greek mythology, race related to the Centaurs, dwelling in Thessaly
Centaurs in battle with C-170
Theseus aids T-117
Laplace (*lā-plās'*), Pierre Simon, 'marquis de (1749-1827), French mathematician and astronomer L-101
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Lapland, region in extreme n. of Norway, Sweden, Finland, and Russia L-101-2, *pictures* L-102
lamps and lighting L-88
people L-101-2, S-462, *pictures* L-102, N-300, P-142c, R-97: children, *pictures* P-142c, N-300
La Plata, Argentina. *See in Index* Eva Perón
La Plata, Rio de, South America. *See in Index* Plata River
La Porte, Ind., city 59 mi. s.e. of Chicago, Ill., near several lakes; pop. 17,882; woolen goods, motor pistons, farm implements: *map* I-78
Lappet moth, moth of the silkworm family; so named because larvae have lobes, or lappets, at sides of bodies: *picture* I-158
Lapps, people of Lapland L-101-2, S-462, *pictures* L-102, N-300, P-142c, R-97
racial classification, *chart* R-22
Lapu'ta, in 'Gulliver's Travels', an island visited by Gulliver G-229
people, *picture* G-229
Lapwing, green plover, or peewit, an Old World plover (*Vanellus vanellus*) having iridescent bottle-green plumage on upper parts, crested head, and white under parts; noted for its wailing cry; its eggs are esteemed as a delicacy: P-321
Laramide (*lār'ā-mīd*) revolution, in geology G-60, R-176, *picture* R-175
Lar'amie, Jacques (1785?-1821), Canadian trapper; in Colorado foothills and s.e. Wyoming 1816-20; first explorer of upper Laramie River; killed by Indians.
Laramie, Wyo., trade center on Laramie River; pop. 15,581: W-326, *maps* W-323, U-252
meadow nearby, *color picture* P-287
state university, *picture* W-325
Laramie Range, or **Laramie Mountains**, in s.e. Wyo.; highest point 9020 ft.: *maps* W-323, U-296, W-316
Larboard (*lār'bōrd* or *lār'bērd*), old term for the left, or port, side of a boat; perhaps derived from Middle English "ladeborde," the loading side; "port" was substituted for larboard to avoid confusion with "starboard," the right side of a boat. *See also in Index* Nautical terms, *table*
Larceny, in law. *See in Index* Law, *table* of legal terms
Larch, a tree L-102-3, *picture* L-102, *table* W-186b
western L-103, *table* W-186b
Larcom, Lucy (1824-93), poet, born Beverly, Mass. In her youth she was a factory worker, and some of her contributions to the factory magazine won praise of John Greenleaf Whittier with whom she later compiled two books; editor *Our Young Folks*; outstanding for poems of life in New England ('Childhood Songs'; 'Wild Roses of Cape Ann and Other Poems'): L-338
Lard, rendered pork fat F-44-5
best hog type for H-404
Larder beetle, a beetle (*Dermestes lardarius*) whose larvae feed on smoked meats, cheese, and other animal substances; also called the bacon beetle.
Lardner, Ring (Wlmer) (1885-1933), writer of humorous stories showing keen insight and reproducing everyday conversation of ordinary men and women; born Niles, Mich.; sports writer on newspapers ('You Know Me, Al'; 'Gullible's Travels'; 'How to Write Short Stories', which contains character sketch 'The Champion'; 'Round Up'; 'First and Last'; 'The Portable Ring Lardner').
Laredo, Tex., city on Rio Grande about 140 mi. s. of San Antonio; agriculture, stock raising, oil and coal; pop. 51,910; ships vegetables and fruit; brick and tile, smelter products, hats; railroad shops: T-80, *maps* T-91, U-252, *picture* T-81
Lares (*lār'ēz*), in Roman mythology, protecting deities of the household, closely associated with the Penates M-476c
in festival for Vesta V-465
Largetooth aspen, tree (*Populus grandidentata*) of willow family, native from Nova Scotia, Canada, to North Carolina, westward to Manitoba, Canada. Grows to 60 ft.; leaves oval, to 4 in. long, margins with large teeth. Also called large poplar, popple, and large American aspen. Wood is soft, weak, light, grayish-white; used for paper pulp, excelsior, matches, and boxes; sold
as "poplar," "cottonwood," and "aspen."
Larghetto (*lār-jēt'tō*), direction in music meaning not quite so slow as largo.
Largo. *See in Index* Music, *table* of musical terms and forms
Largs (*lār'gəz*), Scotland, watering place in Ayrshire, on Firth of Clyde, 30 mi. s.w. of Glasgow; pop. 8606: *map*, *inset* B-324
battle of (1263) T-120
Lariat, noosed rope used by cowboys to catch cattle or horses C-154
Laridae (*lār'i-āē*), bird family, including gulls and terns.
Larisa, or **Larissa** (*lār'i-sā*), Greece, city in Thessaly on Salambria River; pop. 41,163; transit trade, textiles; important city in ancient times: *maps* G-189, E-417
Lark, a group of small perching birds forming the family *Alaudidae*; name also applied to other birds that are like or likened to members of the lark family, such as the meadowlark, the titlark, or lark sparrow: L-103
horned L-103, *color picture* B-186; care of young B-174; courtship flight B-171; nest, *picture* L-103
Lark hunting B-353
state bird, *table* B-158
Lark sparrow, bird of middle and w. U. S., head streaked chestnut and white; tail white-edged; good singer; also called lark finch.
Larksprn, or **delphinium** L-103, *picture* L-103
planting, directions for G-13, *table* G-16
poison in P-338
La Rochefoucauld (*lā rōsh-fō-kō'*), François, due de (1613-80), French courtier and writer, born Paris; engaged in court intrigues against Cardinals Richelieu and Mazarin; famous for his 'Maxims' and 'Mémoires'.
La Rochelle (*lā rō-shēl'*), fortified seaport of w. France; pop. 45,864; once great maritime city and center of French Protestantism: *maps* F-259, E-425
Edict of Nantes H-339
Richelieu besieges R-152
La Rothière (*lā rōt-yēr'*), village in France 125 mi. s.e. of Paris; Allies under Blücher defeated French under Napoleon (1814).
Larrey, Dominique Jean, Baron. *See in Index* Ambulance
Larsen, ancient Sumerian city in s. Mesopotamia, on w. bank of old Euphrates River, 15 mi. s.e. of ancient Erech; temple libraries and important documents found in the ruins.
Larva, in zoology L-104, I-156-7
ant A-255, 256, *picture* A-254
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beetle B-104, *pictures* B-104, 106; Japanese, *picture* I-163; Junc J-364
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marine snail and slug S-204
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- sphinx moth, *color picture* I-154c
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- Larynx (*lār'ingks*), the organ of voice V-516-17, *color pictures* P-241-2, *diagram* L-351
- La Salle (*lā sā'l*), René Robert Cavelier, sieur de (1643-87), French explorer L-104-5, *picture* L-104
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Hennepin, his assistant H-334
Illinois history I-27: Chicago C-231, 236
Indiana history I-86
Mississippi River history L-104, 105, A-191
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Texas history T-94
- La Salle, Ill., industrial, trade, and mining center on Illinois River, 82 mi. s.w. of Chicago; pop. 12,083; zinc smelting; coal: *map* I-36
- La Salle College, at Philadelphia, Pa.; Roman Catholic; for men; founded 1863; arts and sciences, business administration.
- La Scala, opera house in Milan, Italy M-247
- Las Casas (*lās kā'sās*), Bartolomé de (1474-1566), Spanish historian and missionary to West Indies L-105, L-124
- Lascaux, Cave of, in s. France; Stone Age cave drawings found here
'The Stag Frieze' D-140, *picture* D-140
- Las Cruces (*krō'sās*), N.M., town 40 mi. n.w. of El Paso, Tex., in rich agricultural region; pop. 12,325; New Mexico College of Agriculture and Mechanic Arts nearby: *maps* N-179, U-252
- Organ Mountains, *picture* N-169
- La Serena, Chile, iron-shipping center about 225 mi. n. of Valparaíso; pop. 37,618; historic cathedral, convents: C-252, *maps* C-250, S-253
- Lashio, town in Burma, 125 mi. n.e. of Mandalay; s.w. terminus of Burma Road; pop. 4638: *map* I-123
- Lashkar, India. *See in Index* Gwalior
- La Sierra College, at Arlington, Calif.; Seventh-day Adventist; opened as academy 1922, chartered as college 1939; arts and sciences.
- Las'ker, Eduard (1829-84), Prussian statesman; important service in civil consolidation of German empire.
- Laski, Harold Joseph (1893-1950), British liberal writer, born Manchester, England; professor political science (University of London after 1926); visiting lecturer in United States; author of many books, chiefly on contemporary political and social-political trends.
- Las Navas de Tolosa (*lās nāv's dō* *tō-lō'sā*), battle of (1212) M-389, S-321
- Las Palmas (*pāl'mūs*), important port on e. coast of Grand Canary Island (Spanish); pop. 138,441. with suburbs; largest city and former capital of the group; cable station: *map* A-46
- La Spezia (*lā spē'tsyā*), Italy, city 50 mi. s.e. of Genoa, on Bay of Spezia; pop. 109,866; important naval harbor; shipbuilding; winter resort; trade center for olive oil, fruits: *maps* I-262, E-416, 425
- Lassa, Tibet. *See in Index* Lhasa
- Lassalle (*lā-sāl'*), Ferdinand (1825-64), German socialist, founder of German social democratic movement; his life was basis of George Meredith's 'Tragic Comedians'.
- Las'sen Peak, volcanic peak in N. California; erupted 1914-21; vast lava beds; height 10,453 ft.: N-36, *maps* C-26, 34, U-303
- Lassen Volcanic National Park, in California N-36, *maps* C-34, N-18
- Lassiter Shelf Ice, in Antarctica, borders Edith Ronne Land, on Weddell Sea; discovered and named by Finn Ronne expedition 1947-48: A-258, *maps* A-259, W-204
- Lasso (*lās'sō*), Orlando di (1532?-94), celebrated composer, forerunner of Palestrina; born Mons, Belgium, where he became choir boy; taken to Italy by patron, viceroy of Sicily; court musician to duke of Bavaria at Munich; composed more than 2,000 works.
- Lasso, rope or a line of leather with a running noose; used for catching horses, cattle, and other animals: *pictures* C-149, R-257
- Last, in shoemaking S-164, W-191, *picture* S-165
- 'Last Days of Pompeii', novel by Bulwer-Lytton giving detailed and vivid picture of life in Pompeii before city was destroyed by eruption of Mount Vesuvius (A.D. 79); realistic description of eruption.
- Lastex, trade name for a rubber filament wrapped with cotton, silk, or rayon fibers; gives great stretch to fabrics woven from it; invented 1931.
- 'Last of the Mohicans, The', novel by James Fenimore Cooper, one of the 'Leatherstocking Tales'; thrilling story of frontier life; romantic idealization of the Indian Uncas.
- Last Supper. *See in Index* Lord's Supper
- 'Last Supper, The', enamel by Jean Reymond, *picture* E-343
- 'Last Supper, The', painting by Leonardo da Vinci V-474, *picture* V-473
- Lasuen, Fermin Francisco de, Spanish missionary to California: C-46
- Las Vegas (*lās vā'gās*), Nev., city 23 mi. n.w. of Hoover Dam; pop. 24,624; tourist center; legalized gambling: *maps* N-133, U-252
- Las Vegas, N.M., agricultural and livestock center 42 mi. s.e. of Santa Fe; composed of modern city (pop. 7494) and old town (pop. 6269); market; Indian and Mexican craft shops; New Mexico Highlands University: N-172, 181, *maps* N-178, U-252
- Laszlo. *See in Index* Ladislaus, Saint
- Lat (*lāt*), monetary unit of Latvia; historical value about 19½ cents.
- Latakia (*lāt-a-kē'ā*), Syria, French Lattaquié (*lā-tā-kyā'*), Mediterranean port 115 mi. n. of Beirut; pop. about 35,000; produces famous Latakia tobacco; ancient Laodicea: S-488, *map* I-224
- Latelstring P-262
- Lateen' sail B-219
- La'tent heat, heat absorbed or released when matter changes state, as when ice melts or water freezes H-319, F-283, W-63
- Lateral pass, in football F-228
- Lat'eran, The, palace in Rome, Italy; original building belonged to Lateranus family; taken from them by Nero; later given to pope by Constantine; used as residence by popes until 14th century; present palace, built in 16th century, now contains two museums.
- Lateran, basilica in Rome, Italy. *See in Index* St. John Lateran
- Lateran Councils, a series of ecumenical church councils held in the Lateran Palace and St. John Lateran at Rome from the 12th to the 16th centuries.
- Lateran Treaty, or Concordat of 1929, between Italy and Vatican P-277
- creates papal state, *picture* P-65
- Laterite (*lāt'ēr-it*), soil S-231
- Latex (*lāt'ēks*), milky juice secreted by various plants G-235
concentrated R-238
frothed sponge R-241: from synthetic latex R-246
guayule G-222c, d
synthetic R-246
yields rubber R-237, 238, *pictures* E-207, R-238-9, B-290, A-421
- Lath. *See in Index* Architecture, table of terms
- Lathe (*lāth*), a machine tool T-153, *pictures* T-152, U-270
- turret T-154
- Lathrop (*lā'thrūp*), Dorothy Pulis (born 1891), writer and illustrator of children's books, born Albany, N. Y.; she illustrated 'Hitty' by Rachel Field, awarded Newbery medal 1930; in 1938, Dorothy Lathrop's own book 'Animals of the Bible' was awarded the first Caldecott medal ever given; among the books written and illustrated by her are: 'Who Goes There?'; 'Presents for Lupe'; 'Let Them Live' illustrations, *picture* L-269
- Lathrop, George Parsons (1851-98), journalist and poet, born Oahu, Hawaiian Islands; married Rose, daughter of Nathaniel Hawthorne; associate editor *Atlantic Monthly*; editor *Boston Courier*; founder American Copyright League.
- Lathrop, Julia Clifford (1858-1932), social worker, born Rockford, Ill.; important work at Hull House, Chicago; chief 1912-21 U. S. Children's Bureau, first woman bureau chief; author of articles on child welfare, care of insane and civil service.
- Lathyrus (*lāth'i-rūs*), a genus of plants of the pea family S-467
- Latifundios, also latifundia, large landed estates
Central America C-174
Italy I-264; Sicily S-176
- Latimer, Hugh (1485?-1555), English Protestant reformer and martyr, bishop of Worcester, whose homely practical preaching largely drove the English Reformation home to the people; burned at stake (with Nicholas Ridley) exhorting his fellow-martyr, "Be of good cheer, Master Ridley, and play the man; we shall this day light such a candle by God's grace in England as I trust shall never be put out."
- Latina, formerly Littoria, Italy, province on land reclaimed from Pontine Marshes s.e. of Rome; fertile farm lands; cap. Latina: I-267, *pictures* I-268
- Latin America, collective name for the 20 nations of southern North America, Central America, South America, and the West Indies speaking languages of Latin origin: L-106-23, *pictures* L-106-11, 113-17, 119, 121, 123, *Reference-Outline* H-379-80. *See also in Index* Central America; South America; and names of separate countries
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art and music L-115-16: painting P-37a, *color pictures* P-36-37a, *Reference-Outline* P-39
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nature protection, Pan American convention on N-39
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significance of term L-107
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Latin Empire, established by Crusaders in 1204 C-522

Latin language L-129-30
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Bible translation (Vulgate) B-136
English language influenced by E-373-4, L-129: words derived from W-312-13
pronunciation L-132
romance languages derived from R-180: French F-286; Italian I-259-60; Spanish S-325
writing, styles B-232, 235

Latin League, confederation of cities of Latium in central Italy, existing from earliest historic times till 338 B.C. R-184

Latin literature L-130-2, *Reference-Outline* L-98d
Augustan Age A-472b, L-130-1
Caesar C-15
Cicero C-307
drama D-131, 136, L-130
Renaissance R-104
Tacitus T-1
Vergil V-452

Latin Quarter, in Paris, France P-84, *map* P-83a

Latins, in ancient times, inhabitants of Latium; also modern Italians, French, and Spanish
contribution to civilization C-328
early history R-180-2, 184
legend of rule of Aeneas A-29
outlook on life L-108

Latin School, Boston, Mass. B-258

Lathius, in Roman mythology, king of Latium and father of Lavinia, wife of Aeneas; name also given to one of the heroes in Torgnato Tasso's 'Jerusalem Delivered'.

Latitude, distance in degrees north and south from equator L-132-5, E-176, 192, *diagrams* L-132-4, *table* L-135. *See also in Index* Longitude finding, *diagram* A-438: at sea N-73-4, 78
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measuring a degree of, *diagram* E-193
pendulum affected by P-118
projection of A-437-8
use in finding directions D-96-9

Latium (*lā'shi-ūm*), ancient district in middle Italy, inhabited by Latins R-180, 181, I-267, *map* I-263
Aeneas, legendary ruler A-29

Latona. *See in Index* Leto

La Tour, Charles Amador do (1596-1666), French governor of Acadia 1628-35; quarreled with Charnisay over governorship; regained post after death of Charnisay in 1650.

Latreille (*lā-trē'y*), Pierre André (1762-1833), French zoologist, born Brives-la-Gallarde, Corrèze; noted for his classifications of insects.

Latrobe, Benjamin Henry (1764-1820), American architect and engineer, born England; to U.S. 1796; surveyor of public buildings, Washington, D.C., 1803; in charge of rebuilding burned Capitol (1815-17).

Latrobe, Pa., borough 34 mi. s.e. of Pittsburgh in agricultural district; pop. 11,811; iron and steel mills,

textile plant; coal and coke; St. Vincent College; *map* P-132

Lattaquié, Syria. *See in Index* Latakia

Latter-day Saints. *See in Index* Mormons

Lattlework, in furniture design. *See in Index* Fret

Lattimore, Eleanor Frances (born 1904), American author and illustrator of children's books, born Shanghai, China; works based on own experiences ('Little Fear'; 'Jeremy's Isle'; 'Indigo Hill').

Lattimore, Owen (born 1900), author and educator, born Washington, D.C.; editor *Pacific Affairs* 1934-41; director Walter Hines Page School of International Relations, Johns Hopkins University, since 1938; political adviser to Chiang Kai-shek 1941-42; deputy director Pacific operations Office of War Information 1942-44 ('High Tartary'; 'Solution in Asia'; 'Situation in Asia'; 'Ordeal by Slander').

La Tuque (*lā tūk*), Quebec, Canada, lumbering center on St. Maurice River 85 mi. n. of Trois-Rivières; pop. 9538; pulp and sawmills, sash and door factories; *maps* C-69, 72

Lat'via, or Let'via (Latvian Soviet Socialist Republic), Russia, on Baltic Sea; 24,840 sq. mi.; pop. 1,800,000; cap. Riga: L-135, *maps* R-260, 266, E-417
cities L-135: Riga R-153b

Lauan (*lā-uān*'), wood of several species of trees of lauan family (*Dipterocarpaceae*), native to Philippines, nearby islands, and S. Asia; often called Philippine mahogany; red lauan has dark red or reddish heartwood and light red sapwood; white lauan has light red-gray heartwood and whitish sapwood; used for interior finish, furniture, small boats, and caskets.

Laud, William (1573-1645), English prelate, archbishop of Canterbury; tried to suppress dissent; beheaded on charge of treason
adviser of Charles I C-190, 191
Oxford University and, *picture* O-433
John Winthrop and W-161

Laudanum, tincture of opium
antidote P-341

Lauder, Sir Harry MacLennan (1870-1950), Scottish comedian, a great favorite for his Scottish songs composed by him and sung in character; knighted 1919.

Landoanière (*lā-dō-nyār*'), René Goulaine de (died 1566), French Huguenot noble; accompanied Jean Ribaut's expedition (1562) to what is now South Carolina; established Fort Caroline colony on St. John's River (1564), but governed badly; wounded in Menéndez' attack; escaped to Europe; wrote memoirs. Fort Caroline National Historical Park Project, *map* N-18

Lane (*lā'n*), Max von (born 1879), German physicist, professor at Berlin University; Nobel prize winner (1914); author of scientific books
crystallography C-525
X-ray spectra X-330

Laugher pigeon P-254

Laughing gas, or nitrous oxide (N₂O), an anesthetic A-246
discovery of properties A-246, D-23, L-307

Laughing gull G-231

Laughing Jackass, an Australian bird A-480

Laughing philosopher. *See in Index* Democritus

Laughing Water, or Minnehaha Falls, Minneapolis, Minn. M-276

Laughlin (*lā'fīn*), James (1806-82), American manufacturer and philanthropist, born Ireland; one of

group which developed Pittsburgh, Pa., as an iron center.

Laughlin, James Laurence (1850-1933), political economist, born Deerfield, Ohio; head of department of political economy, University of Chicago, 1892-1916; prepared monetary reform scheme for Santo Domingo government, 1894-95; author of works on economics.
"Laughs last laughs best, he who" F-2

Laughton, Charles (born 1899), American actor, born Scarborough, England; first appearance on N.Y. stage 1931 ('Payment Deferred'); in motion pictures from 1932; won Academy award 1933 for his role in 'The Private Life of Henry VIII' ('The Barretts of Wimpole Street'; 'Mutiny on the Bounty'; 'Hunchback of Notre Dame'; 'Rembrandt'; 'The Beachcomber'); devoted much time to programs of dramatic readings from lecture and theater platforms.

Lancelot. *See in Index* Lancelot

Launceston (*lān'sēs-tōn*'), England, quaint old town in Cornwall 21 mi. n.w. of Plymouth; pop. 4467; George Fox, the Quaker, imprisoned here (1655): *map* B-325

Launceston, city of Tasmania in n.e. on Tamar River; pop. 40,449, with suburbs; trade with Victoria and South Australia: *map* A-489

Launching, of steamships S-158-9

Launderette, a laundry service L-135

Laundromat, a laundry service L-135

Laundry L-135-6, *pictures* L-135-6
Chinese method, in China C-263
hydroextractor, principle C-178
marking ink I-150
soap S-211-14
Swedish "big wash" S-464
wash day in Brittany, *picture* B-327

Launfal (*lōn'fāl*'), Sir, knight of the Round Table and steward to King Arthur, in the Arthurian legends; hero of James Russell Lowell's 'Vision of Sir Launfal'.

La Unión (*lā ŷūn*'), El Salvador, chief port, on Gulf of Fonseca at e. end of El Salvador; pop. 7890.

Laura (1308-48), lady loved by Petrarch and celebrated in his poems R-103

Lauraceae (*lā-rā'sē-ē*), the laurel family of plants, including laurel, bay, and sassafras L-137

Laurana (*lā-q-rā'nā*'), Francesco da (1420?-1502), sculptor and medalist of Dalmatian origin; worked chiefly in Italy and France; stressed design rather than realism.

Laureato, poet P-332

Laurel, Miss., city 76 mi. s.e. of Jackson, in yellow pine region; pop. 25,038; Masonite, lumber milling, cotton and cotton products, machinery, vegetable canning; *maps* M-303, U-253

Laurel, name given various flowering trees and shrubs L-137, *picture* L-137
camphor tree C-55
crown of poets, heros P-332, D-17
evergreen leaves E-450
lambkill. *See in Index* Lambkill
mountain laurel. *See in Index* Mountain laurel
myth of Daphne and Apollo D-17
source of word "laureate" P-332

Laurelwood. *See in Index* Madrona

Laurence, Samuel (1812-84), English portrait painter
portrait of Tennyson, *picture* T-73

Laurençin (*lō-rūn-sān*'), Marie (born 1885), French painter, born Paris; a modernist with highly individual

style; representative works are portrayals, in soft, pale colors, of wispy feminine creatures.

Laurens (*lō-rāns'*), **Henri** (born 1885), French sculptor, born near Paris, France; identified with modernists who emphasized purely plastic forms: S-82

Laurens, Henry (1724-92), statesman, born Charleston, S. C.; father of John Laurens; president of Continental Congress 1777-78; one of commissioners to negotiate peace after Revolution: R-129

Laurens, John (1754-82), American soldier in Revolutionary War, son of Henry Laurens; confidential secretary to George Washington, whom he accompanied in all his battles; because of gallantry and courtesy called the "Bayard of the Revolution"; killed in a skirmish shortly before peace with England was concluded.

Laurent, Robert (born 1890), American sculptor, born France; fine feeling for mass and plane; achieved vital beauty in direct carvings in stone, marble, and wood; especially noted for figures in alabaster and plant forms in wood.

Laurentian, division of geologic time, *table* G-57

Laurentian Library, in Florence, Italy L-183, *picture* L-182

Laurentian Mountains, or **Laurentides**, in Canada C-75, *picture* C-70

Laurentian Plateau, also **Canadian Shield**, highland area in Canada L-137, C-75, G-54, N-253-4, S-20, *diagram* G-54, *maps* C-67, N-245, U-250

Adirondacks A-21

lakes C-77, *picture* C-70

Manitoba M-78, 79

Michigan M-220

Ontario O-384

Laurentides Provincial Park, in Quebec, Canada, about 30 mi. n. of Quebec City; 3670 sq. mi., 1500 lakes; trout fishing: *map* C-72-3

Laurentius, Saint. *See in Index* **Lawrence, Saint**

Laurie, Alexander (born 1892) American horticulturist, born France; to U.S. 1902; professor of horticulture Ohio State University 1929-52; professor emeritus since 1952

subirrigation P-309

Laurier (*lō-rē-yā'*), **Sir Wilfrid** (1841-1919), Canadian statesman L-138, C-101-2

Lauritsen, Charles Christian (born 1892), American physicist, born Denmark; professor at California Institute of Technology since 1935; research on nuclear physics, electron emission, and X rays.

Laurium, or **Laurion**, Greece, hill range 20 mi. below Athens; in ancient times known for silver mines: *map* G-197

Lausanne (*lō-zān'*), Switzerland, beautiful city 1 mi. n. of Lake Geneva; pop. 106,807; 13th-century cathedral; university: *maps* S-475, E-416, 425

Lausanne, Treaty of (1912), closed Turko-Italian War; gave Tripoli to Italy.

Lausanne, Treaty of (1923), revised Treaty of Sèvres, extending Turkey's territory: W-240, G-193

Dardanelles D-18

Lausanne, Treaty of (1932), reduced German reparations W-243

Laut, Agnes Christina (1871-1936), Canadian author, born Stanley, Ontario; authoritative historical books on early explorers and pioneer life in the Northwest ("The Conquest of the Western Empire";

"Pathfinders of the West"; "Vikings of the Pacific"; "Life of Cadillac").

Lauterbrunnen (*lō-tēr-brūn-ēn'*), Switzerland, village 34 mi. s.e. of Bern; pop. 2819; lace manufactures.

Lautrec, Henri de Toulouse. *See in Index* **Toulouse-Lautrec**

Lauts (*lōuts*), primitive people of Borneo B-254

Lauson (*lō-zōn'*), Quebec, Canada, town on St. Lawrence River 1½ mi. n.e. of Levis; pop. 9643; aerated waters, trunks, boxes; shipyard.

Lava (*lā'vā*), molten rock discharged from volcanoes or intruded between rock strata under the ground L-138, E-186-7, R-167, V-518-20, *picture* L-138. *See also in Index*

Lava soil

cinder cone, *picture* E-186

Etna lava fields E-411

Galápagos Islands, *picture* S-258

Idaho beds I-14

igneous rocks formed by solidification of M-266, *diagram* G-49

Vesuvius, eruptions of V-465; destruction of Pompeii and Herculaneum P-366-7

Lava Beds National Monument, in California N-36, *map* N-18

Laval (*lā-vā'l'*), **François de Montmorency** (1623-1708), first Roman Catholic bishop of Quebec, Canada, born Montigny-sur-Avre, France; arrived in Quebec 1659 as vicar apostolic of New France; founded Seminary of Quebec 1663; Laval University named for him: *picture* C-95b

Laval, Pierre (1883-1945), French statesman; rose in few years from obscurity to dominant position in French politics; minister of public works 1925; later was undersecretary of state, senator, minister of labor, foreign minister, and in 1931-32 and 1935-36 premier; vice-premier 1940; collaborated with Hitler, serving as chief of Vichy government April 1942-Aug. 1944; convicted of treason and shot: F-272

Lavalleja (*lā-vā-yā'hü*), **Juan Antonio** (died 1853), liberator of Uruguay from Brazilian rule 1825-28; dictator 1827-28; insurgent against later governments.

Laval University (Université Laval), City of Quebec, Quebec, Canada; Roman Catholic; founded 1852 by the Seminary of Quebec (1663); arts, agriculture, canon law, commerce, law, medicine, nursing, pedagogy, philosophy, sciences, social sciences, surveying and forest engineering, theology; graduate school; affiliated schools; teaching in French: Q-10-11, *picture* Q-9

'L'Avare'. *See in Index* **'Avare, L'**

Lava soil, from volcanoes V-518

M-267

Central America C-172

Idaho I-14

Java J-325

n.w. United States U-300-1

Lavater (*lā-vā'tēr*), **Johann Kaspar** (1741-1801), Swiss poet and mystic, founder of physiognomy, the art of reading character, especially from facial features.

Lavatera (*lāv-q-tērā*), a genus of plants and shrubs of the mallow family, native to warm regions of the world. Leaves lobed, often maplelike; flowers, 5 petals, in axils of leaves or in loose clusters, white through red; entire plant somewhat hairy or grayish; tall species used as windbreaks; also called tree mallow.

Lavender, an aromatic shrub of the mint family native to s. Europe

perfume made from, *picture* P-148

Lavender lace flower. *See in Index* **Trachymene**

'Larven'gro', a semiautobiographical story by George Henry Borrow dealing with his early adventures and his wanderings with the gypsies.

Laveran (*lāv'rān'*), **Charles Louis Alphonse** (1845-1922), French physician; Nobel prize in medicine 1907: M-402

La Vérendrye (*lā vā-rān-drē'*), **Pierre Gaultier de Varennes**, sieur de (1685-1749), French Canadian explorer and fur trader, born at Trois-Rivières, Canada; pushed westward in search of the Western Sea; visited Mandan Indian villages on the Missouri. Two of his sons, François, chevalier de la Vérendrye, and Louis Joseph de la Vérendrye, visited North Dakota and possibly reached the foothills of the Rocky Mts.: C-96, *picture* F-322

Manitoba M-80

site of Winnipeg W-156

Vérendrye National Monument N-38c, *map* N-18

Lavery (*lāv'ēr-i*), **Sir John** (1856-1941), British painter, born Belfast, Ireland; renowned chiefly for portraits and figure work done in a broad style; also landscape and historical works; knighted 1918.

Lavinia, in Roman mythology, daughter of Latinus and Amata; betrothed to Turnus but married Aeneas who killed Turnus in single combat (Vergil's 'Aeneid' books 7, 10, and 12).

Lavinium, ancient town of Latium, 17 mi. s. of Rome, Italy; said to have been founded by Aeneas and named after his wife, Lavinia.

Lavisse (*lā-vēs'*), **Ernest** (1842-1922), French historian, born France; professor at Sorbonne; member of French Academy; wrote and edited histories of Prussia, France, and Europe.

Lavoisier (*lā-vwā-z'yā'*), **Antoine Laurent** (1743-94), French chemist L-138-9, *picture* L-139

combustion explained by C-221-2, O-436

head of powder works W-143

theories about heat H-320

Lavongai (*lā-vōng-gā-ē*), formerly New Hanover, island in Bismarck Archipelago; 460 sq. mi.; pop. 5000: *map* P-16

Lavra, famous monastery of Greek church, at Kiev, Russia K-39

Lavransdatter, Kristin, heroine of a trilogy of novels with medieval setting by Sigrid Undset ("The Bridal Wreath", "The Mistress of Husaby", "The Cross").

Law, Andrew Bonar (1858-1923), British statesman, born New Brunswick, Canada, of Scottish parentage; taken to Scotland as child; made a fortune as iron merchant; began career in Parliament in 1900, becoming leader of Conservative party; helped to form coalition government in World War I; prime minister 1922.

Law, John (1671-1729), Scottish financier, born in Edinburgh; lived in London until convicted of killing a man in a duel; fled to the Continent, where he proposed new government credit systems based on paper money and colonial exploitation; appointed controller-general of French finance (1720); inflation beyond his control followed; escaped to Italy and died in Venice

"Mississippi Bubble" L-334

A LIST OF COMMON LEGAL TERMS

- Acquittal.** The action taken by a jury when, upon trial, they find that the accused is not guilty and enter a verdict accordingly.
- Administrator.** A person appointed by probate court to manage and to distribute the estate of a person who has died without a will; distinguished from an executor.
- Affidavit.** A written statement which is sworn to before an officer who has authority to administer an oath.
- Alias (*ā'li-ās*).** A description of the defendant that results from adding to his real name other names by which he is known.
- Alibi (*āl'i-bi*).** Proof offered by one accused of a crime that he was in a different place from that at which the crime was committed at the time it was committed.
- Allen.** A resident of a country who was born outside that country and who has not become a naturalized citizen.
- Arraignment.** The calling of a prisoner before a judge (sitting in his courtroom) to answer the accusations contained in an indictment.
- Arson.** Under common law, the malicious burning of the house owned by another person; under statutes, the house need not be one owned by another person.
- Assault.** Force unlawfully directed or applied to another under circumstances of personal violence.
- Assignment.** Transfer of a property right or title to some particular person under an agreement, usually in writing.
- Attachment.** Preliminary legal seizure of property to force compliance with a decision which may be obtained in a pending suit.
- Bailment.** Delivery of possession of, but not title to, tangible personal property by one person to another under an agreement that it will be held in trust for a special purpose and that it will be returned when the purpose has been accomplished.
- Bankruptcy.** The condition of being unable to pay one's debts as they become due.
- Bench warrant.** An order issued by a judge for the attachment or arrest of a person.
- Bequest.** A gift by will of personal property. A bequest is the same as a legacy.
- Blue laws.** A name applied to certain laws, originally in force in the New England states, which were extremely rigorous.
- Brief.** A written or printed argument furnished to the court by an attorney which sets forth the pertinent facts of the case being tried and the laws applicable to it.
- Carte blanche (*kārt blānsh'*).** Unlimited authority—granted by one person to another—to impose conditions which will be binding upon the person granting such authority.
- Chattel.** Personal property, movable or immovable, which is less than a freehold; for example, a book, a coat, a pencil, growing corn, a lease.
- Codicil.** A written instrument that adds to or qualifies a last will and testament.
- Common law.** The body of law which includes both the unwritten law of England and the statutes passed before the settlement of the United States.
- Confiscation.** Appropriation of private property for public use without compensation.
- Contempt of court.** Any willful disobedience to, or disregard of, a court order or any misconduct in the presence of a court; punishable by fine or imprisonment or both.
- Contract.** An agreement between two or more competent persons to do or not to do some lawful act for a consideration.
- Copyright.** The exclusive privilege of printing, publishing, and vending copies of writings or drawings.
- Correspondent (*kō-rē-spōn'dēnt*).** A term sometimes applied to a third person, who is accused of committing unlawful acts with the defendant, by the party seeking a divorce from the defendant.
- Corporation.** A fictitious legal person which has rights and duties independent of the rights and duties of real persons and which is legally authorized to act in its own name through duly appointed agents.
- Decree.** The judgment or sentence of a court of equity which corresponds to the judgment of a court of law.
- Deed.** A written document for the transfer of land or other real property from one person to another. A quitclaim deed conveys only such rights as the grantor has. A warranty deed conveys specifically described rights which together comprise good title.
- De facto.** A term used to denote a thing done in fact but without strict legal authority as contrasted with *de jure*, which denotes a thing done according to law.
- De jure.** See De facto in this table.
- Dower.** The provision which the law makes for the support of a widow during her lifetime out of income produced by the real estate owned by her husband during the marriage. This provision for the support of a widow is usually favored over the claims of her deceased husband's creditors.
- Easement.** A right enjoyed by the owner of one parcel of land, by reason of this ownership, to use the land of another for a special purpose.
- Endorsement (also indorsement).** The act of transferring title to a written negotiable instrument by having the temporary owner write his name on the back of the document.
- Equity.** A system of law designed to furnish remedies for wrongs which were not legally recognized under the common law of England or for which no adequate remedy was provided by the common law.
- Escrow.** A written agreement between two parties providing that a third party hold money or property until the conditions of the agreement are met.
- Estate.** A term commonly used to denote the sum total of all types of property owned by a person at a particular time, usually upon his death.
- Evidence.** In law, all facts, testimony, and documents presented for the purpose of proving or disproving a question under inquiry.
- Executor.** In law, the person designated by a testator in his will to carry out the terms of that instrument.
- Ex officio (*ēks ō-fish'i-ō*).** Term used to designate powers exercised by public officials by virtue or because of the office they hold.
- Ex parte (*ēks pā'r'tē*).** Term used to designate action taken by one party in the absence of the opposite party, usually after giving notice.
- Ex post facto.** Term used to designate action taken to change the effect given to a set of circumstances. This action relates back to a prior time and places this new effect upon the same set of circumstances existing at that time.
- Extradition.** The surrender by one state to another of a person charged with a crime. This surrender is made in response to the demand of the latter state that the accused be returned to face the charge.
- Felony.** A serious crime, such as murder, larceny, or robbery, punishable by death or by imprisonment in a state or federal penitentiary.
- Fine.** Payment of money demanded of a person convicted of a crime or a misdemeanor; the fine is imposed by a court as punishment.
- Fixture.** An article which was once a chattel but which has now become a part of the real estate because the article is permanently attached to the soil or to something attached to the soil.
- Foreclosure.** The legal process by which the mortgagor's equitable or statutory right to redeem mortgaged property is terminated.
- Forgery.** The act of criminally making or altering a written instrument for the purpose of fraud or deceit; for example, signing another person's name to a check.
- Freehold.** An interest in land which permits the owner to enjoy possession of real estate during his life without interference from others.
- Garnishment.** The process by which a judgment creditor seizes money, which is owed to his judgment debtor, from a third party known as a garnishee.
- Grand jury.** At common law, a group of persons consisting of not less than twelve nor more than twenty-four who listen to evidence and determine whether or not they should charge the accused with the commission of a crime by returning an indictment. The number of members on a grand jury varies in different states.
- Guarantee.** In law, a contract under which one person agrees to pay a debt or perform a duty if the other person who is bound to pay the debt or perform the duty fails to do so.
- Habeas corpus.** An order signed by a judge directing a sheriff or other official, who has a person in his custody, to bring that person before the court to determine whether or not he should be released from custody.
- Hearsay.** That kind of evidence which is not entirely within the personal knowledge of the witness but is partly within the personal knowledge of another person.
- Heir.** At common law, this term was restricted to lawfully born children who could inherit land from an ancestor; under statutes, it includes all those who have the right to inherit from a deceased person.
- Honorarium.** Money or other valuable property given in gratitude for services rendered; for example, payments to ministers for presiding at weddings and funerals.
- Indemnity.** An agreement whereby one party agrees to secure another against an anticipated loss or damage.
- Indictment.** A formal written charge against a person which is presented by a grand jury to the court in which the jury has been sworn.
- Indorsement.** See Endorsement in this table.

(Continued on the next page)

A LIST OF COMMON LEGAL TERMS—*Concluded*

Injunction. A court order which restrains one of the parties to a suit in equity from doing or permitting others who are under his control to do an act which is unjust to the other party.

Ipsa facto. By the fact itself or by the very nature of the case.

Joint tenancy. A method by which one person mutually holds legal title to property with other persons in such a way that when one of the joint owners dies, his share automatically passes to the surviving joint owners by operation of law.

Judgment. The declaration, by a court, of the rights and duties of the parties to a lawsuit which has been submitted to it for decision.

Larceny. Illegal taking and carrying away of personal property belonging to another with the purpose of depriving the owner of its possession.

Lease. An instrument conveying the possession of real property for a fixed period of time in consideration of the payment of rent.

Legacy. A gift of money or of personal property, title to which is passed under the terms of a will.

Libel. In law, a false defamation expressed in writing, printing, or picture which injures the character or reputation of the person defamed or which exposes him to public ridicule; distinguished from slander.

Lien. In law, the right to retain the lawful possession of the property of another until the owner fulfills a legal duty to the person holding the property, such as the payment of lawful charges for work done on the property.

Manslaughter. The unlawful killing of a human being without malice or premeditation; distinguished from murder, which requires malicious intent.

Misdemeanor. A crime—less serious than a felony—which is punishable by fine or imprisonment in a city or county jail rather than in a penitentiary.

Mortgage. The transfer of title to real estate which is made to secure the performance of some act such as payment of money by the person making the transfer. Upon the performance of the act, the grantee agrees to convey the property back to the person who has conveyed it to him.

Murder. See Manslaughter in this table.

Notary public. An official authorized by the state to attest or certify legal documents.

Option. A contract whereby one person purchased the right for a certain time, at his election, to purchase property at a stated price.

Patent. A grant made by the government to one or more individuals entitling them to exercise some privilege not

granted to others during the period they are so authorized to exercise that privilege.

Per capita. Term used to designate a system of inheritance under which an individual descendant takes a share which is equal in size to the shares of each of the other descendants, regardless of whether that descendant is the child, grandchild, or great-grandchild of the decedent.

Perjury. The offense of willfully making a false statement when one is under oath to tell the truth.

Per se (pēr sē). By or of itself; for example, slander *per se*, where the words spoken are obviously defamatory and the injured party is not required to prove damage to his character.

Per stirpes (pēr stīr'pēz). Term used to designate a system of inheritance under which children take among them the share which their parent would have taken had he survived the decedent. Thus the children are said to claim their shares by representing their parent.

Petit jury. The ordinary trial jury of twelve persons whose duty it is to find facts as opposed to the grand jury whose duty it is to return an indictment.

Power of attorney. An instrument by which one person authorizes another to act for him in a manner which is as legally binding upon the person giving such authority as if he personally were to do the acts.

Precedent. The body of judicial decisions in which were formulated the points of law arising in any given case.

Prima-facie (pri'mq-fā'shī-ē) evidence. Evidence that is sufficient to raise a presumption of fact or to establish the fact in question unless rebutted.

Probate. In law, the process of proving before a probate court that a will has been properly executed according to the statutory requirements.

Pro rata (prō rā'tq). Term used to designate the system of distributing the assets of an estate in equal proportion among all the members of the same class of beneficiaries.

Referendum. A system of legislation whereby proposed laws are submitted to popular vote.

Replevin. A proceeding employed by a party to regain possession of personal property which was illegally taken from him.

Riparian rights. Legal rights of owners of land bordering on a river or other body of water; also, law which pertains to use of the water for that land.

Sedition. Conduct which is directed against a government and which tends toward insurrection but does not

amount to treason. Treasonous conduct consists of levying war against the United States or of adhering to their enemies, giving them aid and comfort.

Slander. In law, a false defamation (expressed in spoken words, signs, or gestures) which injures the character or reputation of the person defamed; distinguished from libel.

Statute. A law established by an act of the legislature.

Subpoena (sūb-pē'nq). An order directed to an individual commanding him to appear in court on a certain day to testify in a pending lawsuit.

Summons. The proceeding to commence an action in a court of law which consists of a notice to the defendant requiring him to serve an answer to the complaint.

Testator. One who has made a last will and testament.

Title. The sum total of legally recognized rights to the possession and ownership of property.

Tort. In law, a wrong or injury which does not grow out of a breach of contract and for which one is entitled to damages; for example, fraud, slander, or libel.

Treason. See Sedition in this table.

Treasure-trove. Precious metals in the form of coins or bullion which are found hidden in the earth or concealed in a house or other private place and which, in the absence of statute, belong to the finder.

Trespass. In law, an unlawful intentional intrusion upon another's property or person.

Trust. An agreement under which one person transfers title to specific property to another who agrees to hold or manage it for the benefit of a third person.

Usury. An illegal profit received on a loan of money.

Venue (rēn'ū). The county in which the facts are alleged to have occurred and in which the trial will be held.

Verdict. The unanimous decision made by a jury and reported to the court on matters lawfully submitted to them in the course of the trial of a case.

Warranty. A statement or agreement by a seller of property which is a part of the contract of sale. The truth of the statement is necessary to the validity of the contract.

Will. In general, any instrument executed with the required formalities conferring no present rights but intended to take effect on the death of the maker, which contains his intention respecting the disposition of his property.

Law L-139-40. See also in *Index* Banks and banking; Commercial law; Factories and factory laws; Government; Government regulation of industry; International law; Jury; Labor legislation; Social legislation. For list of the more common legal terms, see *table* on this and on preceding page
arbitration: commercial A-294; industrial A-294, 295; international A-294-5, picture A-295
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ü = French u, German ü; gem, go; thin, then; ñ = French nasal (Jean); zh = French j (z in azure); k = German guttural ch

- Law, merchant, for regulating medicinal trade R-107
- Law, scientific. See in *Index* name of law, as Ohm's law
- Law, The, division of the Old Testament P-419
- Lawes, Sir John Bennet (1814-1900), English agriculturist, born Rothamsted, England; there founded experimental farm on family estate; developed a fertilizer by treatment of phosphates with sulfuric acid.
- Lawn, a stretch of grass G-167
- planting G-15
- weeds W-84-5
- Lawn, originally a fine linen fabric made in Laon, France; now a light thin cotton material, white, dyed, or printed.
- Lawn tennis T-70-2, *pictures* T-70-1
- Law of comparative costs I-192
- Law of Reciprocity, in international trade I-194
- Lawrance, Charles Lanier (1882-1950), aircraft engineer, born Lenox, Mass.; designed and perfected radial, air-cooled engine called "Wright Whirlwind"; official Wright Aeronautical Corporation 1923-30, later organized Lawrence Engineering and Research Corporation.
- Lawrence, Saint, also Laurentius, or Lorenzo (died 258?), Christian martyr, called "the Deacon," friend of the poor; commemorated August 10; meteorites appearing about that time known as "tears of St. Lawrence"
- Escorial at Madrid, Spain, built in his honor, *pictures* M-27
- martyrdom M-104
- Lawrence, Abbott (1792-1855), manufacturer and diplomat, born Groton, Mass.; brother of Amos A. Lawrence; minister to Great Britain 1849-52; founded Lawrence Scientific School of Harvard University
- Lawrence, Mass., named for L-141
- Lawrence, Amos Adams (1786-1852), merchant and philanthropist, born Groton, Mass.; brother of Abbott Lawrence; did much to establish cotton textile industry in New England; gave freely to schools and charities. His son Amos Adams (1814-86) was chief founder of Lawrence College, at Appleton, Wis.
- Lawrence, Charles (1709-60), English soldier and statesman, born Portsmouth, England; lieutenant governor of Nova Scotia, Canada, 1754-56, governor 1756-60
- Acadians deported during rule A-6
- Lawrence, David (Herbert) (1885-1930), English novelist, poet, and painter. His novels are characterized by a sensitive delineation of nature and individual emotion, with a tendency toward the morbid and abnormal ('Sons and Lovers'; 'Women in Love'; 'Kangaroo'). He also wrote essays ('Twilight in Italy') which have an enduring quality of richness of description, and poems, some of which were illustrated by his own drawings ('Birds, Beasts and Flowers'): E-383
- Lawrence, Ernest O(rlando) (born 1901), physicist, born Canton, S.D.; on faculty University of California since 1928, director radiation laboratory since 1936; Nobel prize in physics 1939 for invention of cyclotron and work on structure of atoms atomic power project, *table* A-464
- Lawrence, Gertrude (1898-1952), English actress; won first success singing 'Limehouse Blues' 1924; starred in stage shows in England and America ('Private Lives'; 'Tonight at 8:30'; 'Susan and God'; 'Skylark'; 'Lady in the Dark'; 'Pygmalion'); author of 'A Star Danced', autobiography 'Lady in the Dark', *picture* T-113
- Lawrence, Sir Henry Montgomery (1806-57), English brigadier general and colonial administrator, brother of John L. M. Lawrence at siege of Lucknow L-339
- Lawrence, James (1781-1813), American naval hero L-140, *picture* L-140
- Lawrence, John L. M., Baron (1811-79), British viceroy and governor general of India, called "savior of India" because his relief of Delhi during the Mutiny (1857) maintained British dominion; brother of Sir Henry M. Lawrence.
- Lawrence, Josephine (born 1897?), author and journalist, born Newark, N.J.; wrote first children's story ever broadcast, 1921; children's books: 'Christine', 'Wind's in the West'; books for adults, 'Years Are So Long', 'If I Have Four Apples', and 'But You Are Young', deal with the problems of lower middle-class family life.
- Lawrence, Marjorie (born 1909), operatic soprano, born Victoria, Australia; operatic debut, Monte Carlo 1932; Metropolitan Opera (New York City) debut 1935; stricken with infantile paralysis, Mexico City 1941; made operatic comeback 1942 although unable to walk.
- Lawrence, Sir Thomas (1769-1830), English court painter, born Bristol; supported family with portrait sketches at age of 10; flattering but often superficial likenesses of English beauties and European sovereigns; the successor of Sir Joshua Reynolds as most celebrated portrait painter of his day ('Mrs. Siddons', 'Princess Lieven', 'Calmady Children', 'Pinkie').
- Lawrence, Thomas Edward (1888-1935), British soldier, explorer, and scholar; called Lawrence of Arabia: L-140, *picture* L-140
- Lawrence, William (1850-1941), American Episcopal bishop, grandson of Amos and son of Amos Adams Lawrence; bishop of Massachusetts 1893-1926 ('Life of Amos A. Lawrence'; 'Memories of a Happy Life'; 'Life of Phillips Brooks').
- Lawrence, William Beach (1800-1881), American jurist; acting governor of Rhode Island; authority on international law.
- Lawrence, Kan., farming and manufacturing center on Kansas River 33 mi. w. of Kansas City; pop. 23,351; Haskell Institute for Indians: *maps* K-11, U-253
- University of Kansas, *picture* K-15
- Lawrence, Mass., manufacturing city on Merrimack River, 30 mi. from sea; pop. 80,536: L-140-1, *maps* M-133, U-253
- 'Lawrence', Perry's flagship, in battle of Lake Erie P-153
- Lawrence College, at Appleton, Wis.; founded 1847; arts and sciences, conservatory of music, institute of paper chemistry; graduate studies; named for Amos A. Lawrence, a Boston merchant who was its chief founder.
- Laws of heredity H-344-8, B-151, *diagram* H-345
- Lawson, Henry (1867-1922), Australian short-story writer and poet, born near Grenfell, New South Wales, Australia: A-493
- Lawson, John Howard (born 1895), playwright and motion-picture script writer, born New York City ('Roger Bloomer' and 'Processional', plays exemplifying expressionism; 'The Theory and Technique of Play Writing').
- Lawson, Robert (born 1892), artist and illustrator of children's books, born New York City; drawings are a fine combination of imagination and humor; illustrated his own book 'Robbut', 'Story of Ferdinand' by Munro Leaf, 'I Hear America Singing' by Whitman, and John Bunyan's 'Pilgrim's Progress'; awarded Caldecott medal 1941 for 'They Were Strong and Good' and Newbery medal 1945 for 'Rabbit Hill'.
- Lawson, Victor Fremont (1850-1925), editor and newspaper publisher, born Chicago, Ill.; owner of *Chicago Daily News*, which he endeavored to maintain without political bias; president Associated Press 1884-1900; advocacy of government savings bank caused him to be called "the father of the postal savings bank in America."
- Lawson's cypress, or Port Orford cedar C-534
- Lawton, Henry Ware (1843-99), U.S. Army officer, born Manhattan, Ohio; in Civil War rose from sergeant to brevet colonel; commanded troops which took El Caney in Cuba in 1898; promoted to major general; killed in attack upon Filipinos at San Mateo, Luzon, P.I.
- Lawton, Okla., industrial city 80 mi. s.w. of Oklahoma City, in irrigated farm district and oil region; pop. 34,757; cottonseed oil, stock feed, dairy products, wooden millwork, cement products; Ft. Sill nearby; Cameron State Agricultural College: *maps* O-370, U-252
- Lawyer, vocation L-140
- American Colonies U-371
- Lawyer fish, burbot, or ling, freshwater fish (*Lota maculosa*), only member of cod family found exclusively in fresh water.
- Laxative, or physic, a medicine H-302
- Layamon (*lā'a-mān*), English poet and priest, lived about 1200; author of the 'Brut', metrical chronicle of Britain, one of monuments of early English language.
- Layard, Sir (Austen) Henry (1817-94), English diplomat, archaeologist, and writer; excavated ruins of Nineveh ('Monuments of Nineveh'): N-239
- Layering, in horticulture G-156, P-296
- Layette, for the baby B-3
- 'Lay of the Last Minstrel, The', poem by Scott S-67
- Laysan (*lā'e-sān*) Island, small coral island belonging to U. S., in Pacific in group lying n.w. of Hawaiian Islands; breeding place for many birds: *map* P-17
- 'Lays of Ancient Rome', a collection of ballads by Macaulay M-3
- 'How Horatius Kept the Bridge', story M-3-4, *color picture* M-3
- Lazarus, beggar in parable of the rich man and the poor man (Luke xvi, 19-30).
- Lazarus, brother of Martha and Mary; raised from the dead by Christ (John xi).
- Lazarus, Emma (1849-87), poet, born New York City; published first poems and translations at 18; did philanthropic work among Jewish refugees from Russia; worked for Jewish nationalism ('Alide'; 'Songs of a Semite')
- poem on Statue of Liberty L-179
- Lazeur, Jesse William (1866-1900), physician, born Baltimore, Md.; with U.S. Army Yellow Fever Commis-

Key: cāpe, āt, fār, fāst, whqt, fāll; mē, yēt, fērn, thēre; īce, bīt; rōw, wón, fōr, nōt, dq; cūre, būt, ryde, fūll, bārn; out;

- sion in Cuba; for experimental purposes allowed himself to be bitten by mosquito carrying yellow fever germ and died: M-403, *picture* R-88a
- Lazuli (*lāz'ū-lī*) bunting, a bird of the finch family B-353
- L. C. L. (less than carload), freight shipments R-68, *picture* R-59
- Lea (*lē*), Fanny Heaslip (1884-1955), writer of short stories and novels; born New Orleans, La. ('Quick-sands'; 'Happy Landings')
- Lea, Henry Charles (1825-1909), American publisher and church historian, remembered for 'A History of the Inquisition of Middle Ages' and 'History of the Inquisition of Spain', the standard books in English in their fields.
- Lea, Homer (1876-1912), soldier and author, born Denver, Colo.; although a hunchback, he became a general in the service of Sun Yat-sen in China; author of two prophetic works on Japan's plans for expansion—"The Valor of Ignorance" and "The Day of the Saxon".
- Lea, Tom (born 1907), painter and writer, born El Paso, Tex.; painted many murals; illustrated J. Frank Dobie's 'Apache Gold & Yaqui Silver' and 'The Longhorns'; covered World War II for *Life* magazine as artist and correspondent; wrote and illustrated 'The Brave Bulls', novel about bullfighting in Mexico, and 'The Wonderful Country', western novel.
- Leacock (*lē'kōk*), Stephen Butler (1869-1944), Canadian educator and humorist, born Swanmoor, Hampshire, England; professor of political economy at University of Chicago 1899-1903, at McGill University 1908-36; author of biographies of Charles Dickens and Mark Twain, and of books on history, economics, and political science; won a wider public with his delightful nonsensical sketches ('Literary Lapses'; 'Behind the Beyond'): C-106b
- Lead (*lēd*), S. D., city in Black Hills; pop. 6422: *maps* S-302, U-252
- Homestake Mine S-296, 305
- Lead (*lēd*), a metallic chemical element L-141, *tables* P-151, M-176, C-211, 214
- acetate, in secret ink I-151
- alloys A-173
- carbonate, basic (white lead) A-10, P-40
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- silver associated in ores S-188
- storage batteries contain B-81
- sulfide (galena) L-141
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- vinegar attacks V-474
- white lead P-40
- 'Lead, Kindly Light', hymn by Cardinal Newman M-168
- Lead brass B-285
- Leader, in fishing F-118e, *list* F-118h
- Lead line, in navigation N-74. *See also* in *Index* Nautical terms, *table*
- Lead mold, in electrotyping E-321
- Lead penells P-116-17, *pictures* P-116-17
- Leadsman. *See* in *Index* Nautical terms, *table*
- Leadville, Colo., mining city in w. center, about 80 mi. s.w. of Denver; pop. 4081; gold, silver, molybdenum mines; one of highest towns in America (almost 2 mi. above sea level): *maps* C-408, U-252
- Leadwort, a plant. *See* in *Index* Plumbago
- Leadwort family, or Plumbaginaceae (*plūm-bāg-i-nā'sē-ē*), a family of plants and shrubs including the prickly thrifts, sea lavender, leadwort, and statice, or thrift.
- Leaf, Munro (born 1905), author of humorous books for children, born present Baltimore, Md. ('The Story of Ferdinand', 'Wee Gillis', illustrated by R. Lawson; 'Reading Can Be Fun', illustrated by author).
- Leaf. *See* in *Index* Leaves
- Leaf, of metal. *See* in *Index* Foil.
- Leaf butterfly. *See* in *Index* Oriental leaf butterfly
- Leaf chafer, a variety of plant-eating beetle B-106
- Leaf-cutter bee B-100, W-52, *color picture* W-51
- egg, *picture* E-269
- Leaf-cutting ant, or parasol ant A-257
- jaws A-254
- Leaf fish, a fresh-water fish (*Monocirrhus polyacanthus*) of northern South America; belongs to family *Nandidae*: *picture* F-103
- Leaf hoppers, a group of insects of the order *Hemiptera*; especially the red-banded leaf hopper (*Graphocephala coccinea*) which infests various flowers, vegetables, shrubs, and weeds: *color picture* I-154b
- killed by spraying S-356-7
- Leaf insect, an insect of tropical regions, with wings amazingly leaf-like in form and color; family *Phasmidae*: I-158, *picture* I-158
- Leaflets L-152
- Leaf River, in Quebec, Canada, outlet of Lake Minto in n.w.; flows n.e. to Ungava Bay; 295 mi. long: *maps* C-69, 72-3
- Leaf rollers, popular name of the *Tortricidae*, a family of small moths, many of whose larvac roll leaves to form a shelter I-163
- Leaf rust, a fungus growth R-297
- League, an ancient unit of long measure which in modern usage varies in different countries from about 2 to about 4 miles: *table* W-87
- League, in baseball B-63-5
- League Island Navy Yard. *See* in *Index* Philadelphia Navy Yard
- League of Nations L-142. *See also* in *Index* Mandates; Plebiscite
- Article X opposed W-149
- council meeting, *picture* W-242
- Danzig under protection of D-17
- Harding's policy H-267
- headquarters at Geneva G-35, 36
- International Labor Organization U-243, L-75, C-249
- limitation of armaments P-102
- Permanent Court of International Justice L-142
- Roosevelt, F. D., supports R-200, 201
- Silesia dispute W-240
- slavery investigation S-197-8
- Taft supports T-5
- U.S. rejects U-386, W-240
- Versailles, Treaty of W-239
- Wilson's policy L-142, W-149
- League of Swiss Cantons (1291). *See* in *Index* Treaties, *table*
- League of Three Petticoats, in Seven Years' War S-107
- League of Women Voters, nonpartisan association of women interested in the promotion of good citizenship and government W-184, 185
- Le'ah, elder daughter of Laban and unloved first wife of Jacob (Gen. xxix).
- Leahy (*lā'hē*), William Daniel (born 1875), U. S. Navy officer, born Hampton, Iowa; chief of naval operations 1937-39; governor of Puerto Rico 1939-40; ambassador to Vichy, France, 1940-42; chief of staff to president of the United States 1942-49; appointed fleet (5-star) admiral 1944.
- Leamington (*lēm'ing-tón*), England, health resort in Warwickshire, 90 mi. n.w. of London; pop. 36,345; mineral springs: *map* B-325
- Leander, lover of Hero H-349
- Leaning tower of Pisa, in Pisa, Italy P-272, *picture* P-273
- Galileo's experiment G-171, *picture* G-171
- Leapfrog, a game, *picture* P-317
- Leap year Y-335, C-22
- Lear, Ben (born 1879), U. S. Army officer, born Hamilton, Ontario, Canada; brought to U.S. 1881; in Army after 1898; commander U.S. Army Ground Forces 1944; retired 1945; created 4-star general 1954.
- Lear, Edward (1812-88), English writer and artist L-142, L-244
- quoted L-142, R-84
- Learning L-143-6, *pictures* L-143-6
- animals P-427
- child development C-239-48, *pictures* C-239-43, 245-8
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- how the senses contribute E-245
- reasons for change E-249-50, 253
- factors in efficient learning L-145-6
- growth and decline of learning ability L-146
- kindergartens and nursery schools K-41-4, *pictures* K-41-3
- memory M-170
- play P-315-20, *pictures* P-315-20
- psychological theories P-427, 428
- readiness C-239, 245a, *picture* C-245a
- reading R-82-4f, *pictures* R-82-82a, c-d, 84-84e
- study S-433-4
- Thorndike's laws of E-246
- Leary, Herbert Fairfax (born 1885), U.S. Navy officer, born Washington, D. C.; commander of Allied naval forces in s.w. Pacific 1942-43; commander of eastern sea frontier, U. S., 1943-45; retired 1946.
- Lease, in law. *See* in *Index* Law, *table* of legal terms
- Lease-lend. *See* in *Index* Lend-lease
- Leasing system, in manufacturing shoe manufacturing S-164
- Least bitter B-201, *picture* B-201
- Least flycatcher, or chebec F-190
- Least grebe G-187
- Least sandpiper S-209
- Least tern G-231
- Leather L-147-50, *pictures* L-147-50
- armor, use in A-376, 377
- artificial L-150: castor bean in C-135
- book bindings B-240-1
- by-products L-149
- embossing E-337, *picture* E-337
- gloves G-126
- kinds L-149-50

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crocodile C-515
goatskin G-129
morocco M-394, L-150
parchment and vellum B-232
patent leather L-150
pigskin H-403
shagreen: ass A-425; sawfish S-52;
shark S-135
processes of preparation L-147-9,
pictures L-148-50
shoes S-162-5
sources L-147
Leatherback turtle T-222, 224, picture
T-223
Leather beetle, *Dermestes vulpinus*;
larvae feed on animal substances,
especially skins.
Leather carp, fish C-127
Leatherette, imitation leather L-150
Leathernecks, nickname of United
States Marines M-97
Leather splits. See in Index Splits
Leatherstocking, nickname of Natty
Bumppo, scout, hero of James Fen-
imore Cooper's 'Leatherstocking
Tales'.
'Leatherstocking Tales', by Cooper
C-468, A-226b
Leavened (*lěv'end*) bread B-295
Leavening
baking powder B-18-19
yeast Y-336-7, pictures Y-336-7
Leavenworth, Henry (1783-1834),
U.S. Army officer and Indian
fighter; built Army posts, later
known as Ft. Snelling (1819) and
Ft. Leavenworth (1827); stationed
at Ft. Atkinson, Neb. (1821-24).
Leavenworth, Kan., city in n.e. on Mis-
souri River; pop. 20,579; steel prod-
ucts, wood products, batteries,
greeting cards; nearby are Ft.
Leavenworth, state and U.S. peni-
tentiaries, and Veterans' Adminis-
tration Hospital; in early days
outfitting point for cross-prairie
wagon trains: maps K-11, U-263
Leaves L-151-4, pictures L-151-2,
color picture L-153
arrangement L-152
autumn coloration L-152-4, color
picture L-153
breathing and eating P-294, picture
L-151, color picture P-292
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coloring matter, chlorophyll P-293,
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flood prevention function F-145-6
food for plant stored in L-151, pic-
ture N-47
form L-154
growth of, pictures N-48, T-184,
H-354
light, response to L-151-2, P-296-7,
picture L-151: compass plants
C-429, L-151; eucalyptus E-412
modifications L-152
carnivorous, or insect eating P-274,
S-464, pictures N-51, P-295, S-455,
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drought resisting G-167
floral L-152
fronds F-52, L-152, pictures F-62
needlelike (conifers) P-259, L-152
seed, picture B-84
mouths (stomata) L-151, P-293, 294
parts L-154
photosynthesis L-151, B-146-7, 148,
P-293-4, 295, diagram N-46
reduction by desert plants C-9, pic-
ture P-299
transpiration P-291
venation (veins) L-151, P-292-3:
parallel, palmate, and pinnate
L-162, pictures L-152
water plants V-66
'Leaves of Grass', poems by Walt
Whitman W-131, A-226f
Leb'annon (from Arabic *laban*, "to be

white"), republic on Mediterranean
n. of Palestine; cap. Beirut: area
estimated from 3475 to 4000 sq.
mi.; pop. 1,165,200; in ancient
times cedars of Lebanon supplied
by Hiram of Tyre for Solomon's
temple (I Kings v): S-487-8, maps
A-406, I-224
Arab League A-290
flag F-137, color picture F-135
relationships in continent, maps
A-406-7, 411-12
Lebanon, Pa., industrial city 26 mi.
n.e. of Harrisburg; pop. 28,156; in
coal, limestone, and iron-mining
district; iron and steel products,
textiles, boots and shoes, paper
boxes; settled in 1700 by German
immigrants: map P-133
Lebanon, cedar of C-158-9
Lebanon Mountains, the western range
of two parallel ranges in w. Syria,
separated by a narrow rich valley;
e. range is Anti-Lebanon; average
height about 7000 ft.
Lebanon Valley College, at Annville,
Pa.; founded 1866 by United Breth-
ren church: arts and sciences.
Le Bel (*lě běl*'), Joseph Achille (1847-
1930), French chemist, born Pechel-
bronn, Alsace; in 1874 set forth
concept of asymmetric carbon atom
independently of his contemporary,
Van't Hoff; carried on many experi-
ments in organic chemistry.
Lebensraum (*lě'bēns-roum*), German
word, meaning "living space,"
slogan of German imperialism;
used by Adolf Hitler to express
Germany's demand for new terri-
tories and economic self-sufficiency.
Leblanc (*lě-blān'*), Georgette (1875-
1941), French actress and writer,
first wife of Maurice Maeterlinck;
as actress of Comédie Française
created emotional roles, especially
Charlotte Corday and Monna
Vanna; after marriage 1901 known
as interpreter of husband's plays.
Leblanc, Maurice (1864-1941), French
writer, born Rouen, France; known
for stories about Arsène Lupin,
gentleman-burglar who turned de-
tective.
Leblanc, Nicolas (1742-1806), French
chemist, born Issoudun, France; in
1789 discovered method of making
soda from common salt; lost both
property and his patent rights in
French Revolution.
Leblanc process, for making soda and
by-products S-225, 226
LeBlon (*lě blōn*'), Jacques Christophe
(1667-1741), French painter and
engraver, born Germany; the
father of modern color printing.
Lo Bourget (*lě bŏr-zhă'*) Flying Field,
Paris, France L-253
Le Bris (*lě brě'*), Jean-Marie (died
1872), French sea captain and in-
ventor; patterned first glider after
albatross: A-101
Lebrun (*lě-brūn'*), Albert François
(1871-1950), 14th president of
France under the Third Republic;
president of the Senate 1931-32;
president of France 1932-40.
Lebrun, Charles (1619-90), French
artist, born Paris; as one of
founders of the Royal Academy of
Painting and Sculpture and director
of Gobelins tapestry manufactory, he
practically directed French art
tendencies during his lifetime; court
artist under Louis XIV.
Lebrun, Elisabeth Vigée (1755-1842),
French portrait and landscape
painter, born Paris; painted por-
traits of royal family including 30
of Marie Antoinette; left France
1789 because of Revolution; re-
turned 12 years later to home near

Paris where she mingled with most
celebrated people of her day: pic-
ture E-443
Le Caron (*lě kă-rōn'*), Joseph (1586-
1632), French Roman Catholic
missionary, born near Paris;
pioneered among Huron Indians in
Canada; compiler of first Huron
dictionary; sent back to France
(1629) by British after capture of
Quebec, Canada: color picture Q-10
Le Chatelier (*lě shă-tě-lyă'*), Henry
Louis (1850-1936), French chemist,
born Paris; known for law of chemi-
cal equilibrium: C-219
Lechfeld (*lěk'fělt*), battle of (955),
on plain of Lechfeld in Bavaria;
Magyars defeated by Otto I: H-448
Lech (*lěk*) River, rapid and tortuous
stream rising in Vorarlberg Alps
at height of 6120 ft.; flows n.
through Bavaria 180 mi., joining
Danube below Donauwörth: map
D-16
Leclithin (*lěs'i-thin*), a fatty sub-
stance found in plant and animal
cells B-145
Leck'y, William Edward Hartpole
(1838-1903), Irish historian and
publicist ('A History of European
Morals'; 'History of England in the
Eighteenth Century')
quoted G-67
Leclaire (*lě-klē'r*'), Edmé Jean (1801-
72), French social scientist;
founded system of profit sharing.
Leclanché (*lě-klēn-shă'*), Georges,
French inventor B-80
Leclanché cell B-80
Leclerc, Jacques Philippe, real name
Jacques Leclerc de Hauteclocque
(1902-47), French army officer;
prisoner of Germans 1940; escaped,
joined Free French; led force across
Sahara to meet General Montgom-
ery 1943; led French into Paris
Aug. 1944; signed for France at
Japanese surrender on U. S. S. *Mis-
souri* Sept. 2, 1945.
Lecocq (*lě-kōk'*), Alexandre Charles
(1832-1918), French composer,
born Paris; produced many light
operas, melodious, gay, and lively
(*'La Fille de Madame Angot'*;
'Giroflé-Girofla').
Lecompton, Kan., town on Kansas
River, 15 mi. e. of Topeka; pop.
263; settled 1854 by proslavery
men and was their headquarters
during contest with free-state set-
tlers for control of the state: map
K-11
Lecompton Constitution, adopted by
proslavery faction of Kansas in
1857
Buchanan urges acceptance B-336
Le Conte (*lě kōnt'*), Joseph (1823-
1901), scientist, born Liberty
County, Ga.; helped popularize geol-
ogy ('Elements of Geology'; 'Reli-
gion and Science').
Leconte de Lisle (*lě-kōnt' dē lēl*),
Charles Marie (1818-94), French
poet, chief of modern Parnassian
school ('Poèmes antiques')
influence on Canadian literature
C-106
Lecoq de Boisbaudran (*lě-kōk' dē
bŏwă-bō-drăn'*), Paul Émile, called
François (1838-1912), French
chemist, discoverer of gallium,
samarium, dysprosium, holmium.
Le Corbusier (*lě kôr-bū-zyă'*), pseu-
donym of Charles Édouard Jean-
neret-Gris (born 1887), Swiss-
French architect; leader in the
development of modern architecture
(*'Towards a New Architecture'*).
Le Creusot (*lě-rŭ-zō'*), town in e.-cen-
tral France, 75 mi. n.w. of Lyons;
pop. 17,133; famous iron and arma-

Key: cāpe, āt, fār, fāst, whāt, fāll; mē, yēt, fērn, thēre; ice, bīt; rōw, wōn, fōr, nōt, dŏ; cūre, būt, rŭde, fŭll, bŭrn; out;

- ments work, textiles: *map* E-425
Lectern (*lĕk'tĕrn*), a reading desk
 medieval, *picture* M-238g
Lecturer, in college U-402
Leeuona (*lĕ-u-ō'na*), Ernesto (born
 1895), Cuban composer, conductor,
 and pianist; piano debut at 5; com-
 posed first work at 11 ('Malagueña';
 'Andalucía').
Leda (*lĕ'da*), in Greek and Roman
 mythology, a fair mortal wooed by
 Zeus (Jupiter) in guise of swan.
Ledger, in accounting B-230
 sample page B-230
Ledo Road. *See in Index* Stilwell Road
Ledue oil field, Alberta, Canada A-142,
 144
Ledyard, John (1751-89), adventurer,
 born Groton, Conn.; dreamed of
 opening up fur trade in Pacific
 Northwest, glimpsed on voyage
 (1776-80) with Captain Cook; en-
 listed interest of John Paul Jones,
 Thomas Jefferson, Sir Joseph
 Banks; failed in two attempts to
 cross Siberia on foot; died during
 expedition into Africa.
Lee, Ann (1736-84), "Mother Ann,"
 founder of the American Society of
 Shakers, born England.
Lee, Arthur (1740-92), diplomat, born
 Stratford, Va.; brother of Richard
 Henry Lee; served as American
 representative in various European
 countries during Revolutionary War.
Lee, Charles (1731-82), American
 Revolutionary War general, born
 England; dismissed for insubordi-
 nation; involved in treasonable in-
 trigues not discovered until after
 his death: R-126, 128b
Lee, Fitzhugh (1835-1905), Confed-
 erate Civil War general, born
 Fairfax County, Va.; nephew of
 Robert E. Lee; military governor of
 Havana, Cuba, after Spanish-Amer-
 ican War.
Lee, Francis Lightfoot (1734-97),
 signer of Declaration of Independ-
 ence, born Stratford, Va.; brother
 of Richard Henry Lee
 signature reproduced D-37
Lee, Henry, called "Light Horse
 Harry" (1756-1818), statesman
 and American Revolutionary War
 general, born Dumfries, Va.; mem-
 ber of Continental Congress 1785-
 88; governor of Virginia 1792-95;
 father of Robert E. Lee
 quoted on Washington W-27
Lee, Jason (1803-45), American
 Methodist missionary and Oregon
 pioneer, born Stanstead, Quebec,
 Canada, then part of Vermont; went
 west with Wyeth's expedition
 (1834) to open mission among Flat-
 head Indians; aided by Dr. Mc-
 Loughlin in settling in Willamette
 Valley; established other missions
 in Clatsop region and at The Dalles:
 O-420
Statuary Hall. *See in Index* Statu-
 ary Hall (Oregon), *table*
Lee, Joseph (1862-1937), social
 worker, born Brookline, Mass.;
 known as "father of American
 playground movement"; organized
 and was president of National
 Recreation Association from 1910;
 president War Camp Community
 Service during World War I
 ('Play in Education'). National
 Joseph Lee Day celebrated July 28.
Lee, Munfred. *See in Index* Queen,
 Ellery
Lee, Mary Randolph Custis (Mrs.
 Robert E. Lee) L-154
Lee, Richard Henry (1732-94), Amer-
 ican Revolutionary War leader
 L-154, D-33
 signature reproduced D-37
Lee, Robert Ed(ward) (1807-70), Con-
- federate general L-154-7, C-334-5,
 336, R-86, *pictures* L-155, R-85b
Antietam A-264, M-5
 birthday celebrated F-56
 birthplace, *picture* V-491
Fredericksburg F-283
Gettysburg G-105-6
Grant and G-152-3, L-157, *picture*
 C-433b
Hall of Fame, *table* H-249
 home at Arlington, national me-
 morial N-17, N-38d, *picture* L-157
John Brown captured B-331, L-156
 quoted S-432
Statuary Hall. *See in Index* Statu-
 ary Hall (Virginia), *table*
Lee, Sir Sidney (1859-1926), Eng-
 lish author and educator; editor
 'Dictionary of National Biography';
 works include 'Life of Shakespeare',
 'Life of Queen Victoria'.
Lee, William (died 1610), English
 clergyman and inventor K-57, 59
Lee, river in Ireland C-480, *map*
 B-325, *picture* I-229
Leeboard, a slab of wood or metal
 hung over the leeward side of sail-
 ing canoes and other small craft to
 prevent drifting sideways C-113
Leech, John (1817-64), English cari-
 caturist, whose *Punch* cartoons
 John Ruskin called "the finest def-
 inition and natural history of the
 classes of our society, the kindest
 and subtlest analysis of its foibles".
Leech, a bloodsucking worm L-157-8,
picture W-302
Leech, nautical. *See in Index* Nauti-
 cal terms, *table*
Leechee. *See in Index* Litchi
Leech Lake, in n. Minnesota; 20 mi.
 long, *maps* M-278, 286
Leeds, city in England, on Aire River;
 pop. 504,954: L-158, *map* B-325
Leeds and Liverpool Canal, England
 L-158
Leek, herb similar to onion O-383
 worn on Saint David's Day F-58
Lee Mansion National Memorial, in
 Virginia N-17, N-38d, *picture* L-157
Leeming, Joseph (born 1897), author,
 editor, and publicist, born Brook-
 lyn, N. Y.; writer of books for chil-
 dren, chiefly on making and doing
 things: 'The Costume Book', 'Fun
 with Magic', 'Fun with Clay', 'Fun
 with Puzzles', 'Fun with Beads'.
Leeuwarden (*lĕ-u-ĕrdĕn*), Nether-
 lands, capital of province of Fries-
 land; pop. 76,679; flourishing trade
 in cattle, grain, fish: *maps* B-111,
 E-424
Leeuwenhoek (*lĕ-u-ĕn-huk*), Anthony
 van (1632-1723), Dutch naturalist
 and microscopist, born Delft, Neth-
 erlands; first to describe red corpus-
 cles of the blood; described and
 illustrated bacteria, yeast plants,
 hydra, and other microscopic life:
 M-165, M-232, B-210
Leenwin (*lĕ-wĭn*), Cape, extreme s.w.
 point of the continent of Australia,
maps A-488, 478
Leeward. *See in Index* Nautical
 terms *table*
Leeward Islands (*lĕ-wĕrd* or *lĕ-ĕrd*),
 British colony in West Indies n. of
 Windward Islands and s.e. of Puerto
 Rico, comprising presidencies
 Antigua, St. Kitts-Nevis, Mont-
 serrat, and British Virgin Islands;
 420 sq. mi.; pop. 108,838; name
 sometimes applied to other West
 Indian islands, such as the chain
 extending westward of Trinidad:
map W-96a
Columbus explores C-419
 name, origin W-94
Leeway, in sailing B-216, *picture*
 N-72. *See also in Index* Nautical
 terms, *table*
Lefebvre (*lĕ-fĕ-vrĕ*), Jules Joseph
- (1836-1912), French painter; em-
 inent as a painter of ideal heads;
 celebrated also for historical and
 allegorical paintings ('Lady Go-
 diva'; 'Mignon').
Lefèvre d'Étaples (*dā-tā'pl*), Jacques
 (1452?-1537), French theologian
 and scholar, born Étaples; also
 known as Jacobus Faber Sta-
 pulensis; pioneer of French Protes-
 tantism; condemned by Sorbonne
 for certain critical works on Bible,
 but protected by Francis I and
 Margaret of Navarre; translated
 Bible into French.
Left, term used in European politics
 P-360
Left-handedness C-240b, H-258, B-281
Leg F-224, 226, *pictures* F-225
hones S-192, *pictures* S-190, 191, 192
insects I-155, *diagram* I-152, *pic-
 tures* I-154
Legney, in law. *See in Index* Law,
table of legal terms
Le Gallienne (*lĕ gāl-yĕn'*), Eva (born
 1899), American actress, born Lon-
 don, England; daughter of Richard
 Le Gallienne; educated in France;
 made American debut at 16; found-
 er and director of Civic Repertory
 Theatre, New York City, in which
 she produced plays of high quality
 and presented them at popular
 prices ('The Swan'; 'The Master
 Builder'); author of 'At 23' and
 'With a Quiet Heart', autobiog-
 raphes.
Le Gallienne, Richard (1866-1947).
 American critic, essayist, and poet,
 born Liverpool, England; father of
 Eva Le Gallienne; 'Prose Fancies',
 'The Quest of the Golden Girl',
 'Pieces of Eight' are imaginative
 prose sketches; 'Odes from the
 Divan of Hafiz', 'English Poems',
 and other volumes of poems include
 many graceful lyrics.
Legal tender, coins and paper money
 that may legally be offered in pay-
 ment of any money debt M-337
Le Gascon (the Gascon), French
 bookbinder of the 17th century; real
 name unknown.
Legaspi (*lĕ-gās'pĕ*), formerly Albay
 (*āl-bī*), Philippine Islands, port of
 Luzon on Bay of Albay; pop. 18,
 987; cap. of Albay province: *maps*
 P-195, A-407
Leg'ate (from Latin *legare*, "to ap-
 point"), specifically an ecclesiastical
 or diplomatic representative of the
 pope; term occasionally used to sig-
 nify any ambassador or diplomat.
Legato. *See in Index* Music, *table* of
 musical terms and forms
Legend (from Latin *legere*, "to read,"
 originally "to gather"), a fictitious
 or improbable story based on tradi-
 tion and some fact, as the legends
 of King Arthur; originally stories
 of saints and martyrs. *See also in
 Index* Folklore
'Legend of Sleepy Hollow, The', story
 by Washington Irving I-254, *picture*
 A-226b
Legendre (*lĕ-zhān'dr'*), Adrien Marie
 (1752-1833), French mathemati-
 cian; a leader in introducing the
 metric system; helped prepare great
 centesimal trigonometric tables;
 made important contributions to
 geodesy.
Léger (*lĕ-zhā'*), Aléxis Saint-Léger
 (born 1887), pseudonym St.-John
 Perse, French poet, born on island
 near Guadeloupe; went to France
 when 11; became permanent secre-
 tary of French ministry of foreign
 affairs 1933; in U.S. since 1940
 ('Eloges', 'Anabase', 'Exil').
Léger, Fernand (born 1881), French
 painter; early work simple ab-

stractions, later turned to cubism and flat-patterned landscapes
 'Interior' D-138, *picture* D-139
Legerdemain (*lěg-ēr-dē-mān'*), sleight of hand M-38-9
Leger (*lěg'ēr*) lines, in musical notation M-468a
Leghorn, Italy. *See in Index* Livorno
Leghorn, a breed of fowls P-402b, *pictures* P-402, 402a, F-30b
Legion, originally name given to Roman citizen-army, from Latin *legere*, "to gather"; in modern times applied to organizations whose members have performed unusual services either civil or military
 American Legion A-223
 Foreign Legion, of France. *See in Index* Foreign Legion
 Roman V-9, *diagram* W-8: legionary A-376, *picture* A-376
Legionary ants, also driver ants, or army ants A-257
Legion of Honor, French order of merit, reward for civil and military services D-40
Legion of Merit Medal, U. S. D-38
Legislative Assembly, body in France during Revolution (1791-92) which succeeded National Assembly of 1789-91; F-293
 Louis XVI deposed L-321
Legislative assembly, in state government S-385
Legislative courts, U.S. C-500
Legislative Reference Library
 Wisconsin establishes W-175
Legislature, the lawmaking body of a government. *See also in Index* Congress; Diet; Parliament
 states of U.S. S-385
Legitimists, party in France which after Revolution of 1830 supported elder line of Bourbons; now applied to any supporter of monarchy by hereditary right.
Legler, Henry Eduard (1861-1917), American librarian and writer, born Palermo, Italy; came to U.S. in early youth; secretary Wisconsin Library Commission 1904-9; librarian, Chicago Public Library after 1909; L-193
Legnano (*lān-yā'nō*), Italy, town 16 mi. n.w. of Milan; pop. 31,959; cotton and silk manufactures; Lombard League defeated Frederick Barbarossa nearby in 1176.
Legnica, Poland. *See in Index* Legnitz
Legree, Simon, a brutal slave driver in Harriet Beecher Stowe's 'Uncle Tom's Cabin'.
Legros (*lě-grō*), Alphonse (1837-1911), French painter and etcher, for nearly 30 years a teacher in London, where his severe yet dignified realism, simple technique, and respect for European painting traditions exerted a powerful influence on English art.
Legumes (*lěg'ūmz*), pod-bearing plants of pea and bean type; form family *Leguminosae*
 acacia A-4-5
 alfalfa A-151-2, *pictures* A-151
 bean B-84, *picture* B-84
 clover C-359-60
 cowpea C-502, *picture* C-502
 lentil L-170
 locust L-294, *picture* L-294
 mesquite M-175, *picture* M-175
 nitrogen-fixing bacteria on roots N-240-1, A-151, C-359, P-297, *pictures* A-151, C-360
 pea P-100-1, *pictures* P-100
 peanut P-104-5, *picture* P-105
 soybean S-308b
 sweet pea S-467, *picture* S-467
 tamarind T-9
 uses: fertilizer C-484; hay H-295
 vetch V-466
Leguminosae. *See in Index* Legumes

Lehar (*lā'hār*), Franz (1870-1948), Austrian composer, born Hungary; noted for light operas ('Gipsy Love'; 'The Yellow Jacket')
 'The Merry Widow' O-397, *picture* O-396
Le Havre (*lě ā'vr'*), 2d seaport of France, at mouth of Seine River; pop. 105,491; H-285, *maps* F-259, E-416, 425
Lehigh River, tributary of Delaware River, about 120 mi. long; rises in Wayne County, e. Pa.; empties into the Delaware at Easton; navigable by locks for 84 mi.; *map* P-122
Lehigh University, at Bethlehem, Pa.; for men; founded 1865; arts and science, business administration, engineering; coeducational in graduate school; institute of research.
Leluhan (*lě'mān*), Herbert H (Henry) (born 1878), banker and statesman, born New York City; banker 1908-28; lieutenant governor of New York State 1928-32; governor 1932-42; director general UNRRA 1943-46; United States senator since 1946.
Lehman Caves National Monument, in Nevada N-36, *map* N-18
Lehmann (*lā'mān*), Lili (1848-1929), German dramatic soprano; because of superb quality and volume of her voice became famous as Brünnhilde, Isolde, and in other Wagnerian roles; also as interpreter of Mozart.
Lehmann, Liza (1862-1918), English soprano and composer; remarkable success as concert singer; married Herbert Bedford, composer, 1894, and retired, devoting herself to composition of songs and song cycles ('In a Persian Garden').
Lehmann, Lotte (born 1888), soprano, born Germany; member Vienna State Opera, also of Chicago, New York, and other leading opera companies of U.S.; noted lieder singer; retired from stage 1951.
Lehmann, Rosamond (Nina) (Mrs. Wogan Phillips) (born 1903), English novelist, born London, England ('Dusty Answer'; 'Invitation to the Waltz'; 'The Echoing Grove').
Lehmbruck (*lām'brūk*), Wilhelm (1881-1919), German sculptor; by the use of exaggerated lines attained great esthetic and rhythmic force ('Kneeling Woman'); S-81
Lehr (*lēr*), oven, in glassmaking G-122, *picture* G-120
Lei (*lā'ē* or *lā*), a rope of flowers worn by Hawaiians; also used as a token of greeting or farewell; H-287, *picture* H-289
Lei, monetary unit. *See in Index* Lei
Leibnitz (*līp'nīts*), Gottfried Wilhelm von (1646-1716), German philosopher, mathematician, and scientist; a many-sided genius, versed in law, theology, and politics; spent much of his time at courts of German nobles and took part in affairs of state. Most famous for his contributions to philosophy and mathematics; his differential method in calculus prevailed over Newton's earlier system; founder of Royal Prussian Academy of Science
 controversy with Newton N-194
Leicester (*lěs'tēr*), Robert Dudley, earl of (1532?-88), English statesman and soldier; his supposed secret marriage to Amy Robsart is the theme of Sir Walter Scott's 'Kenilworth'
 favorite of Elizabeth I E-333
Leicester, Simon de Montfort, earl of. *See in Index* Montfort
Simon de Leicester, or Leicestershire, England, n. midland county; 832 sq. mi.; pop. 630,893; cap. Leicester; *map* E-347

Leicester, England, capital of Leicestershire county, on Soar River, 90 mi. n.w. of London; pop. 285,061; hosiery, boots and shoes, lace; Roman remains; *map* B-325
 Southfields Library, *picture* L-184
Leicester, breed of sheep S-138
Leiden, Netherlands. *See in Index* Leyden
Leidy (*lī'dī*), Joseph (1823-91), naturalist, born Philadelphia, Pa.; professor anatomy 1853-91 and director biology dept. 1884-91, University of Pennsylvania; research in vertebrate paleontology of America ('On the Fossil Horse of America').
Leif Ericson. *See in Index* Ericson, Leif
Leigh, Vivien (Lady Olivier) (born 1913), English actress of stage and screen, born Darjeeling, India, as Vivian Mary Hartley; wife of Sir Laurence Olivier; twice won Academy award (motion pictures) for acting in 'Gone with the Wind' (1939) and 'A Streetcar Named Desire' (1951).
Leigh (*lě*), town in Lancashire, England, 20 mi. n.e. of Liverpool; pop. 48,714; dates from 12th century; silk, cotton, glass, iron; *map* B-324
Leighton (*lā'tōn*), Frederick, Baron (1830-96), English painter and sculptor; most popular works largely of classical subjects; S-80
Leighton, Margaret (born 1896), author, born Oberlin, Ohio; daughter of Thomas Nixon Carver, professor of political economy at Harvard University for many years; books for children: 'The Singing Cave'; 'Judith of France'; 'The Sword and the Compass'.
Leinsdorf, Erieh (born 1912), Austrian-American conductor, born Vienna, Austria; conductor Cleveland (Ohio) Orchestra 1943; conductor Rochester (N. Y.) Philharmonic Orchestra from 1947.
Leinster (*lěn'stēr*), one of 4 provinces of Ireland, in middle and s.e. part; 7580 sq. mi.; pop. 1,336,576; *map* I-227
Leipzig (*līp'sīk*), Germany. city in Saxony, 70 mi. n.w. of Dresden; pop. 607,655; L-158, B-248, *maps* G-88, E-416, 424
Leipzig, battle of (1813) N-10
Leipzig, battle of, or battle of Breitenfeld (1631) G-234
Leipzig, University of (renamed Karl Marx University 1953 by East Germany's Communist government), 3d in size and 3d in age of the universities of Germany; established 1409 by 400 teachers and students who seceded from University of Prague as result of Hussite agitations; medicine, law, theology, and liberal arts and sciences; L-158
Leisler (*līs'lēr*), Jacob (1640-91), popular leader in colonial New York, born Germany; executed for insurrection; N-214
Leisure L-158-61, *pictures* L-159-60
 activities for leisure time L-159-61; competition to be avoided L-159, 160; educational U-332, recreational U-334
 books about L-161
 farm life F-29-30
 hobbies H-387-401, *pictures* H-387-90, 392, 394, 397-401; books about H-388-401
 increase L-158-9, *chart* I-145
 Industrial Revolution, influence of L-158
 parks and playgrounds P-86a-d, *pictures* P-86a-d
 radio, use of R-51
 sports A-449-50, *pictures* A-449-50
 standards of living affected L-158

Key: cāpe, āt, fār, fāst, whāt, fāll; mē, yēt, fērn, thēre; īce, blt; rōw, wōn, fōr, nōt-dq; cūre, būt, rȳde, fūll, bārñ; out;

- time and money spent on L-161
vacation activities V-421-32, *pictures*
V-421-31, *Reference-Outline*
V-421-32
- Leith (*lēth*), Scotland, seaport and
shipbuilding center on s. shore of
Firth of Forth; port for Edin-
burgh, with which it was incor-
porated 1920; map B-324
- Leitmofit (*lēmō-tēf*), in opera O-388
created by Richard Wagner M-464
- Leitrim (*lē'trim*), county in Con-
naught province, Ireland; 589 sq.
mi.; pop. 41,209; lost more by emi-
gration than any other county;
beautiful scenery, especially along
River Shannon; organized as
county 1583; map I-227
- Lek, a county of Ireland, map I-227.
See also in Index Laoighis
- Lejeune, John Archer (1867-1942),
U.S. Marine Corps officer, born
Pointe Coupee Parish, La.; gradu-
ated U.S. Naval Academy 1888;
commanded Marine brigade at cap-
ture of Vera Cruz, Mexico, 1914; in
World War I commanded 2d Division
A. E. F. 1918-19; took part in
battles of Saint-Mihiel, Meuse-Ar-
gonne; major general in command
of Marine Corps 1920-29; superin-
tendent Virginia Military Institute
1929-37, superintendent emeritus
after 1937.
- Le Jeune, Paul (1591-1664), French
Jesuit missionary, born Châlons-
sur-Marne; 1632-39 was in Quebec,
Canada, as superior of Canadian
missions.
- Leland, Charles Godfrey (1824-1903),
poet, ethnologist, traveler, and pio-
neer educator in art handicraft,
born Philadelphia, Pa. ('Hans
Bretmann's Ballads', poems in
Pennsylvania Dutch dialect).
- Leland Stanford Junior University.
See in Index Stanford University
- Lely (*lē'li*), Sir Peter, real name
Pieter van der Faes (1618-80),
English court painter, born Ger-
many, of Dutch family; portraits of
beautiful women of court of Charles
II.
- Lemaître (*lē-mē'tr'*), Jules (1853-
1914), French critic and dramatist
(*'Impressions of the Theatre'* and
'Contemporaries', widely read crit-
ical essays; 'The Pardon', 'The Poor
Little Thing', plays).
- Léman, Lac. *See in Index* Geneva,
Lake
- Le Mans (*lē mǎn'*), commercial and
manufacturing town in n.w. France
on river Sarthe, 115 mi. s.w. of
Paris; pop. 90,693; French under
General Chanzy defeated 1871 by
Germans; again fell to Germans
1940; maps F-259, E-425
- Lemare, Edwin Henry (1866-1934),
English organist and composer;
organist in London, England, at
Carnegie Institute, Pittsburgh, Pa.,
San Francisco, Calif., Portland, Me.,
and Chattanooga, Tenn.; composed
organ and choral works, and made
transcriptions of orchestral works
for organ.
- LeMay (*lē-mā'*), Curtis E(merson)
(born 1906), U. S. Air Force officer,
born Columbus, Ohio; Air Force deputy
chief of staff for research and
development 1945-47; commanding
general U. S. Air Forces in Europe
1947-48; commanding general Strategic
Air Command after 1948; be-
came 4-star general 1951.
- Lemay (*lē-mā'*), Léon Pamphile
(1837-1918), Canadian poet and
novelist; educated in theology and
law; librarian to Quebec legisla-
ture 1867-92 ('Les Vengeances',
'Petits poèmes', 'Les Gouttelettes',
'Reflets d'antan', poetry; 'Le Pé-
lerin de Sainte Anne', 'L'Affaire
Sougraine', fiction): C-106
- Lemberg, Russia. *See in Index* Lvov
- Lemelin, Roger (born 1919), French-
Canadian writer, born Quebec,
Canada ('Au Pied de la Pente
Douce', English title 'The Town
Below', novel of life in French-
Canadian quarter of Quebec):
C-106a
- Lemery (*lēm'er-i*), Nicolas (1645-
1715), French chemist, born Rouen;
renowned as a lecturer; his 'Cours
de Chymie' a standard work for
about a century.
- Lemming, a small rodent of the
mouse family, *Myridae* M-244
- Lemmon slave case (1854), famous
law case in which Chester A.
Arthur, later president of U. S., won
from highest state courts the deci-
sion that a slave who was brought
into New York State thereby be-
came free.
- Lem'nos, island in n. Aegean; 150 sq.
mi.; pop. 23,842; held in turn by
ancient Greeks, Byzantine Empire,
Italians, and Turks; Greek after
World War I: maps G-189, A-27
- fabled home of Hephaestus H-341
- Lemon, a citrus fruit L-161-2, color
picture F-309
introduced into Europe C-522
perfume making L-162, picture P-148:
synthetic odor P-148
producing regions L-161
'sympathetic' ink I-151
vitamin C V-496
- Lemon chrome, a pigment formed with
chromium compounds C-300
- Lemounier (*lē-mō-niā'*), Pierre
Charles (1715-99), French astron-
omer; made many observations of
Uranus before its discovery as a
planet; these observations in turn
led to the discovery of the planet
Pluto.
- Lemon verbena, a perennial plant
(*Lippia citriodora*) related to
lantana; flowers white or lilac
in a 3-spike cluster; leaves lemon-
scented, with glandular dots;
native to South America.
- Le Moyne (*lē mōn'*), famous family
of French-Canadian explorers and
soldiers, members of which (father
and 7 of his 11 sons) are better
known by territorial titles. *See in*
Index Bienville; Iberville
- LeMoyne (*lē-moin'*) College, at Mem-
phis, Tenn.; controlled by American
Missionary Association; founded
1870; liberal arts.
- Le Moyne College, at Syracuse, N. Y.;
Roman Catholic; founded 1946; arts
and sciences, business administra-
tion.
- Lempira (*lēm-pērā*), monetary unit
of Honduras, historical value about
50 cents.
- Lemur (*lē'mūr*), a fox-faced monkey-
like animal L-162
altitude range, picture Z-362
- Lemur, flying. *See in Index* Flying
lemur
- Lemuria, hypothetical continent M-20
- Le Nain (*lē nān'*), Antoine (1598?-
1648), Louis (1593-1648), and
Mathieu (1607-77), French painters,
brothers; depicted interiors; also
portrayed scenes of everyday life of
peasants; pictures grayish and dull
in color.
- Lenape, Indians. *See in Index* Dela-
ware
- Lenard (*lā'nārd*), Philipp (1862-
1947), Hungarian physicist; head
of radiological institute at Heidel-
berg, Germany, 1909; awarded No-
bel prize for physics 1905; X-329
- Lena River, in n.e. Siberia; empties
into Arctic, forming vast delta;
length 2860 mi.: S-174, maps R-259,
A-406, 411-12
- length, comparative. *See in Index*
Rivers, table
- Lenan (*lā'nou*), Nikolaus, pseudonym
of Nikolaus Franz Edler von
Niernbsch von Strehlenau (1802-
50), Austrian poet, born Hungary;
intense melancholia gave his lyrics
somber, pessimistic tone; died in-
sane ('Faust'; 'Savonarola'; 'Die
Albigenser').
- Lenbach (*lēm'bāch*), Franz von (1836-
1904), German portrait painter;
called "greatest of his generation";
master of characterization; painted
Emperor William I and Bismarck.
- Lend-lease
- Lend-lease Act (1941) R-213,
215, W-254
termination of lend-lease T-197
- Lenepveu (*lēm-vē*) Jules Eugène
(1819-98), French painter; best
known for classical and historical
paintings and for decorative fres-
coes in theaters, churches, and pub-
lic buildings ('The Martyrs in the
Catacombs')
'Joan of Arc', picture H-447
- L'Enfant (*lān-fān'*), Pierre Charles,
Major (1754-1825), French en-
gineer, who planned Washington,
D.C., born Paris; came to fight in
American Revolution before Lafay-
ette; served as captain of engineers
under Steuben and later was
wounded in action at Savannah, Ga.,
and captured by British at Charles-
ton, S. C. After war, worked as
architect in New York City until
called (1791) by President Wash-
ington to prepare plans for federal
capital: W-27
grave N-16b
- Length, in physics. *See in Index*
Measurement; Metric system; Rela-
tivity; Weights and measures
- Length of life. *See in Index* Life, sub-
head length of; Vital statistics
- Lenin (*lēm'in*), Nikolai, real name
Vladimir Ilich Ulyanov (1870-
1924), Russian Bolshevik leader
L-162, C-426, R-270, 288-9, pictures
S-361, R-291
- Leningrad named for L-162
- Stalin and S-361, picture R-291
- tomb M-398, picture M-397
- Trotsky and T-192
- Leninakan (*lē-nē-nā-kān'*), Russia,
formerly Alexandropol or Aleksan-
dropol, city in Armenia, 85 mi. s.w.
of Tiflis; pop. 75,000; silk manufac-
tures; Russians routed Turks here
1853; much destruction by earth-
quake 1926; maps R-267, E-417
- Leningrad (*lēm'in-grād*), Russia, for-
merly St. Petersburg, and Petro-
grad, chief commercial city of U.S.
S. R., former capital of Russia; pop.
3,300,000: L-162-4, maps R-266,
E-417, pictures L-163-4, R-286
cities, world's largest. *See in Index*
City, table
- National Public Library L-183
- New Year's custom N-195
- siege (1941-44) L-164. *See also in*
Index Siege, table
- Len'ep, Jacob van (1802-68), Dutch
poet and novelist, born Amsterdam;
wrote patriotic songs and historical
romances of which 'De Pleegzoon'
(The Adopted Son) is most famous.
- Lenni-Lenape, Indians. *See in Index*
Delaware
- Lenoir (*lē-nwār'*), Étienne (1822-
1900), French inventor of first prac-
tical gas engine I-186
- Lenoir-Rhyne College, at Hickory,
N.C.; Lutheran; founded 1891; arts
and sciences.
- Lenormand (*lē-nōr-mān'*), Henri René
(1882-1951), French dramatist;
plays deal with psychoanalytical

and often abnormal themes ('The Failures'; 'Time Is a Dream'; 'Man and His Phantoms').

Lenox, Walter Scott (1859-1920), potter, born Trenton, N. J.: P-399

Lenox porcelain P-399

Lenroot, Katharine Fredria (born 1891), social worker, born Superior, Wis.; served in Children's Bureau, U.S. Department of Labor, 1915-34, and was chief 1934-51.

Lens (*lāns*), France, coal-mining and iron-manufacturing city 135 mi. n.e. of Paris; pop. 34,134; victory of French under prince of Condé over Spaniards (1648).

Lens (*lānz*), in optics L-164-70, *diagrams* L-165-9

aberrations (spherical and chromatic) L-169, T-46-7

camera L-168-9, P-221-2: how image is formed on film, *picture* P-216

contact, for eye S-330

eye, human (crystalline lens) E-459, E-462, *diagram* E-459

fluorite M-265

fused quartz, properties Q-3

glass employed G-122a

limits of enlargement M-235

microscope M-232, 235

quartz Q-3

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spectacles S-330

stereopticon S-391, 392, *diagrams* S-392

stereoscopic camera S-392

telephoto P-224

telescope T-46-7, 48, G-122a

Lenski, Lois (born 1893), writer and illustrator of books for children, born Springfield, Ohio; historical backgrounds are based on old records and diaries ('Bound Girl of Cobble Hill'; 'Ocean-Born Mary'; 'Indian Captive'); regional stories based on her experiences in different parts of U.S. ('Strawberry Girl', winner of Newbery medal in 1946; 'Boom Town Boy'; 'Prairie School'; 'Corn-Farm Boy'); picture books for small children ('Little Airplane'; 'Mr. and Mrs. Noah'; 'Cowboy Small'; 'Papa Small').

Lent, in Christian church E-200, F-59

Shrove Tuesday E-200, *picture* F-57

Lentil, a leguminous plant L-170

Lento. See in *Index* Music, *table* of musical terms and forms

Lenz's law, of electromagnetic induction E-305

Leo, popes. For complete list, see in *Index* Pope, *table*

Leo I, the Great, Saint (died 461), pope, commemorated as saint April 11: L-170

Attila and H-451

Leo III, Saint (died 816), pope, commemorated as saint June 12: L-170, *picture* M-237

crowns Charlemagne C-187-8

Leo IV, Saint (800?-855), pope, commemorated as saint July 17: L-170

Leo IX, Saint (1002-54), pope, commemorated as saint April 19: L-170

Leo X (1475-1521), pope L-170, M-163

Leo XIII (1810-1903), pope L-170

Leo III, the Isaurian (680?-741) (ruled 717-41), Byzantine emperor; saved empire from Saracens; freed serfs and reduced taxation: *picture* M-237

campaign against images B-374

Leo, or Lion, a sign of the zodiac Z-352, *charts* S-376, 380, A-434, *picture* Z-352

Regulus in S-374, *charts* S-376, 380

Leofric (*lē-ōf'rik*), earl of Mercia (died 1057), husband of Lady Godiva C-502

Leominster (*lēm'in-stēr*), Mass., industrial city on Nashua River, 40

mi. n.w. of Boston; pop. 24,075; plastics, paper, woollens: *map* M-132

León (*lā-ōn'*), Alfonso de (1610?-1700?), Spanish explorer, born in Mexico; governor of Coahuila; led expedition into Texas in 1689 to stop French settlements: T-94

León, Ponce de. See in *Index* Ponce de León

León, Mexico, city 200 mi. n.w. of Mexico City; pop. 122,585; center of agricultural and mining district; cereals, potatoes, fruit, livestock; shoes, soap, textiles: *maps* M-189, 194

León, Nicaragua, city 45 mi. n.w. of Managua; pop. 30,544; in fertile farming district; corn, coffee, sugar cane, cattle and dairy products; National University; cathedral (completed 1780); city founded 1524 on shore of Lake Managua; after destruction by earthquake, city was moved in 1610 to present site; former capital of Nicaragua: *maps* C-172, N-251

León, Spain, ancient kingdom and modern province in n.w.; cap. León (pop. 59,549, with suburbs): *map* E-425

early history S-321

Isabelia, queen of I-255

Leonard, William Ellery (1876-1944), poet and educator, born Plainfield, N. J.; professor of English, University of Wisconsin; noted for poems of sharp beauty showing great depth of feeling ('Two Lives', 'A Son of Earth', poems; 'The Locomotive God', autobiography).

Leonardo da Vinci. See in *Index* Vinci, Leonardo da

Leoncavallo (*lā-ōn-kā-vā'llō*), Ruggero (1858-1919), Italian composer, born Naples, Italy; in early years strongly influenced by Wagner; best known for opera 'I Pagliacci'; other operas include 'Zaza', 'Chatterton', 'Der Roland von Berlin'; wrote own librettos; also composed symphon'c poem story of 'I Pagliacci' O-392

Leonidas (*lē-ōn'i-dās*), king of Sparta, killed 480 B.C. at Thermopylae P-159

Le'onids, meteor group M-180, 182

Leonov (*lē-ōn'ōf*), Leonid Maksimovich (born 1899), Russian novelist ('The Badgers': 'Sot')

place in Russian literature R-295

Leontes (*lē-ōn'tēs*), in Shakespeare's 'A Winter's Tale', king of Sicily W-160

Leopard (*lēp'ērd*), animal of the cat family L-170-1, *pictures* L-170, A-250

protective coloration, *picture* P-421

'Leopard', British warship W-11

Leopard cat. See in *Index* Ocelot

Leopard frog F-299-300

Leopardi (*lā-ō-pār'dē*), Giacomo, Count (1798-1837), Italian lyric poet, prose writer, and scholar, master of finished style and slave of pessimism ('La Ginestra').

Leopard's-bane. See in *Index* Doronicum

Leopard seal, or harbor seal S-88, 90

Leopold I (1640-1705), Holy Roman emperor, elected 1658; defeated Turks and French; subdued Hungarian revolt and made Hungarian crown hereditary

War of Spanish Succession A-497

Leopold II (1747-92), Holy Roman emperor, elected 1790; son of Maria Theresa and brother of Marie Antoinette; died before events of French Revolution called for intervention he had prepared: A-498

Leopold I (1790-1865), king of the Belgians, German prince, uncle of

Queen Victoria; elected 1831; called 'Nestor of Europe': B-115

Leopold II (1835-1909), king of the Belgians; succeeded 1865; notorious profligate but able ruler: B-117

develops Congo State B-109, S-368

rival claims in Africa A-50

Leopold III (born 1901), king of the Belgians, son of Albert I; succeeded 1934; surrendered Belgium to Germans 1940 and held by Germans; brother Charles elected regent Sept. 1944; Leopold recalled by parliament July 1950; gave up powers to son, Baudouin, Sept. 1950 and abdicated 1951: B-117

Leopold I (died 994), margrave of Austria A-496

Leopold V (1157-94), duke of Austria, succeeded 1177; went on Crusades 1182 and 1190; quarreled with Richard I in Palestine: A-496

imprisons Richard I R-150

Leopold, Order of, Belgian military decoration D-40

Leopold II, Lake, in w. Belgian Congo, *map* B-109

Leopoldville, capital and chief inland port of Belgian Congo; on Congo River; pop. 257,197; terminal of Matadi-Leopoldville railroad: C-434d, *map* A-47

Lepachys (*lēp'a-kis*), annual or perennial plants of the composite family, native to North America. Grow 2 to 5 ft.; leaves finely cut; flowers solitary, on wiry stems, ray florets, 6 or 7, yellow or purple, droop from the cylindrical thimble-like center of disk florets that are first silver gray, later brown; called yellow, gray-headed, or long-headed coneflower.

Lepanto (*lē-pān'tō*), battle of (1571), fought in Gulf of Corinth near Lepanto, Greece T-220a

Cervantes at C-179

galleys N-91

Lepaya, or Liepaja, German Ilhau, Baltic port in Latvian Soviet Socialist Republic; railroad terminus, and manufacturing city, pop. 75,000; ice-free artificial harbor; large export trade; metalworking; shelled by German fleet in World War I: *map* R-266

Lep'idolite, a mineral M-266

Lepidoptera, the order of scaly-winged insects including butterflies, moths, and skippers B-365, 369

Lep'idus, Marcus Aemilius (died 13 B.C.), wealthy Roman, triumvir with Antony and Octavian (Augustus) A-472a

Leporidae (*lē-pōr'i-dē*), a family of rodents including hares, rabbits.

Leprechaun (*lēp'rē-kōn*), in Irish superstition a pygmy sprite sometimes inhabiting wine cellars, sometimes farmhouses, and aiding in work; possesses treasure which a human being may get by keeping his eye fixed on sprite.

Leprosy, chronic disease of skin and nerves. Cause, leprosy bacillus, discovered by G. H. A. Hansen (1841-1912) of Norway. Chaulmoogra oil or hydnocarpus oil or their derivatives long most effective treatment; later sulfone drugs used with good results. It is estimated that there are more than 3,000,000 lepers in the world. Seven hospitals for patients with leprosy are maintained by the United States, its territories and dependencies. They are located as follows: Carville, La.; Panama Canal Zone; near Rio Piedras, Puerto Rico; St. Croix, Virgin Islands; Kalaupapa on Molokai and Hale Mohalu near Pearl City, Oahu, Territory of Hawaii; Tinian, one of the Marianas.

- Kalaupapa, Molokai, Hawaiian Islands H-288a
- Philippine Islands P-198
- Leptis Mag'na, ancient seaport in Libya, 100 mi. e. of Tripoli; founded by Phoenicians; became splendid Roman city; birthplace of Emperor Septimius Severus; ruins of harbor, beautiful sculptures, and buildings have been uncovered: L-219, pictures L-218, A-300
- Leptocephalus (*lêp-tô-sêf'g-lûs*), larva of eels E-267
- Lepton (*lêp'tôn*), plural lepta, a minor coin of ancient times, worth about 1/10 cent; Jerusalem lepton famed in Bible as "widow's mite"; also a modern bronze Greek coin worth 1/100 drachma.
- Lepus, or Hare, a constellation, chart S-379
- Le Puy (*lê pii-ê'*), France, town 140 mi. n.w. of Marseilles; pop. 18,347; 12th-century cathedral; lace, textiles, chocolate, spirits: map E-425
- Lérda (*lâ'rê-dâ*), Spain, walled cathedral city 80 mi. w. of Barcelona; pop. 52,849, with suburbs; leather, glass, textiles; as a Celtiberian city, Iberia, heroically resisted Romans: map E-425
- Lérins (*lâ-rîns'*), monastery of, on island of Lérins in Mediterranean 3 mi. from Cannes, France M-355
- Lerma (*lêr'mâ*) River, rises 18 mi. w. of Mexico City and flows 281 mi. w. to Lake Chapala, from which it emerges as Rio Grande de Santiago and flows 340 mi. n.w. to Pacific Ocean. The Santiago is noted for scenic beauty of its canyon and, near Guadalajara, for the Juanacatlán Falls, which are 50 feet high and 430 feet wide: M-191
- Lermontov (*lêr'môn-tôf*), Mikhail Yurievich (1814-41), Russian poet and novelist; ranked next to Pushkin as greatest Russian poet; despised society; felt at home only in Caucasus ('On the Death of a Poet', 'Song of the Merchant Kalashnikov', poems; 'Hero of Our Time', first Russian psychological novel).
- Lerolle (*lê-rôl'*), Henri (1848-1929), French painter known for large landscapes with few figures and realistic portrayal of evening light ('At the Organ', 'In the Country').
- Le Roy, Pierre (1717-85), French horologist
- chronometer L-313
- Lerwick, capital and chief town of Shetland Islands, Scotland, on s.e. coast of Mainland Island; pop. 5538: map, inset B-324
- Le Sage (*lê sâzh'*), Alain René (1668-1747), French novelist and dramatist; a satiric realist ('Gil Blas', comic masterpiece of adventurous roguery).
- Les Baux (*lâ bô*), or Beaux, a village in s. of France, near Arles
- gives name to bauxite ore A-182
- Lesbos, ancient name for Greek island Mytilini. See in Index Mytilini
- Lescage (*lê-sâzh'*), William (born 1896), American architect, born Geneva, Switzerland; came to U. S. 1920; leader in modernism; functionalist; regular-lined style.
- Les Châteaux (*lâ shê-nô'*), islands in Lake Huron M-219
- Leschetzky (*lê-schê-tits'kê*), Theodor (1830-1915), Polish teacher of piano; pupil of Czerny, he became eminent pianist; taught in St. Petersburg and Vienna; won chief fame as teacher of Paderewski; had many other distinguished pupils, including Gubrilowitsch; composed opera 'Die Erste Falt' and brilliant piano numbers.
- Leslie, Sir John (1766-1832), Scottish mathematician and physicist, born Fife County, Scotland; inventor of a differential thermometer, photometer, and hygrometer; used air pump and sulfuric acid to freeze water and thus invented a process of artificial refrigeration.
- 'Les Misérables' (*lâ mē-sâ-râ'b'l*), novel by Victor Hugo H-441-2
- Lespedeza (*lê-s-pê-dê'zâ*), a plant C-360, picture A-151
- Lespinasse (*lê-s-pê-nâs'*), Julie Jeanne Eléonore de (1732-76), French letter writer and social leader, noted particularly for her love letters: C-459
- Lesseps (*lê-sêps'*), Ferdinand, vicomte de (1805-94), French engineer, born Versailles; served as consul at Cairo, Rotterdam, and Barcelona
- builds Suez Canal S-442a, b
- Panama disaster P-54
- Lesser Antilles, eastern islands of West Indies; 6000 sq. mi.; pop. 1,833,000: W-93, map W-96a
- Lesser Slave Lake, in central Alberta, Canada; about 475 sq. mi.: maps C-68, 80
- Lessing, Gotthold Ephraim (1729-81), German critic and dramatist; helped free German literature from French influence; famous for 'Laokoon', a critical work on poetry and plastic arts that had great influence ('Minna von Barnhelm', perennially popular comedy; 'Emilia Galotti', tragedy; 'Nathan the Wise', noble poetic drama of religious tolerance): G-85
- Lesueur (*lê-sû-ûr'*), Charles Alexandre (1778-1846), French zoologist and artist; did earliest American work on marine invertebrates and fishes of Great Lakes; called "Raphael of zoological painters"; with Owen's colony at New Harmony, Ind.
- Le Sueur, Pierre Charles (1657?-1705?), French explorer, trader; a leader in exploration of Northwest America: M-280
- Lesvos, Greek island. See in Index Mytilini
- "L'état c'est moi" (*lâ-tâ' sé muä*) L-319
- Lethbridge, Alberta, Canada, city 115 mi. s.e. of Calgary on Oldman (Belly) River; pop. 22,947; distributing point for coal, lumber, farm products; district headquarters for Royal Canadian Mounted Police: maps C-68, 80
- average annual precipitation A-142
- Letho (*lê-thê*), in Greek mythology, river of oblivion H-241
- Leto, in Greek mythology, mother of Apollo and Artemis (Roman Latona)
- Niobe and N-239
- Lettered cone shell (*Conus literatus*), mollusk shell, color picture S-139
- Lettering, in mechanical drawing M-157e, picture M-157f
- pencil M-157b
- Letter of credit C-509-10
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- Letters of the alphabet. See in Index Alphabet; also story heading each letter section of the Fact-Index
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- social letters L-171-3
- Letts, people of Latvia L-135
- Lettuce, a plant L-175, pictures L-175
- harvesting, picture U-270
- when and how to plant, table G-19
- Letvka, Russia. See in Index Latvia
- Leu (*lê'q*), plural lei (*lâ*), a monetary unit of Rumania; historical value less than 1 cent (divided into 100 bani).
- Leucemia. See in Index Leukemia
- Leucippus (*lû-sip'ûs*), Greek philosopher about 5th century B.C.; regarded as founder of the atomic theory, adopted and improved by Democritus.
- Leucite (*lû'sit*), a rock-forming mineral of potassium and aluminum metasilicate, found in basaltic lavas, and sometimes used in crude form as fertilizer: M-266
- Leucocytes. See in Index White corpuscles
- Leuctra (*lûk'tra*), battle of (371 B.C.) named for village of Leuctra in Boeotia T-116, picture T-115
- Leukemia (*lû-kê'mi-q*) D-105
- Lenthen (*lô'tên*), Germany, village in Lower Silesia, 9 mi. w. of Breslau
- battle of Seven Years' War, picture G-97
- Leutze (*lôit'sû*), Emanuel (1816-68), American portrait painter, also painter of historical subjects, born Germany; painted the well-known 'Washington Crossing the Delaware'.
- Leuven, Belgium. See in Index Louvain
- Lev (*lêv*), plural leva, monetary unit of Bulgaria since 1928, historical value less than 1 cent in U.S. money; at one time equal to gold franc, worth 19.3 cents.
- Levant (*lê-vânt'*), Oscar (born 1906), composer, pianist, motion-picture actor, and radio artist, born Pittsburgh, Pa.; author, 'A Smattering of Ignorance'.
- Levant, term meaning "rising (of the sun)" applied to the countries along e. Mediterranean.
- Levantine Sea M-166
- Levee, an embankment R-156, F-144-5. See also in Index Dike
- asphalt mattress, picture F-145
- flood control, Mississippi River M-308, F-144-5, pictures F-144, G-43, U-280
- natural formation F-145, diagram F-144
- shortcomings F-145
- Level. See in Index Spirit level
- Levene, Phoebus Aaron (1869-1940), American biochemist, born Sagor, Russia; member Rockefeller Institute 1907-39; worked out formula for structure of nucleic acids; in 1930 purified and concentrated vitamin B₂.
- Le'ever, Charles James (1806-72), Irish novelist, a storyteller, with inexhaustible fund of bolsterous good humor; wrote of everyday people and of army life ('Charles O'Malley', 'Harry Lorrequer').
- Lever, a mechanical device M-160-160a, b, pictures M-160a-b
- Archimedes discovers principle A-303
- in weighing machines W-85
- Leverhulme, William Hesketh Lever, first Viscount (1851-1925), English businessman; established huge soap works (Lever Brothers) with associated companies all over world; model industrial village at Port Sunlight near Liverpool; instituted profit-sharing plans.
- Le Verrier (*lê vê-ryâ'*), Urbain Jean Joseph (1811-77), French astronomer; discoverer of planet Neptune.

- Le'vi**, Hebrew patriarch, 3d son of Jacob and Leah, ancestor of tribe of Levi, or Levites.
- Leviathan** (*lè-vî'q-thân*), Hebrew name for sea monster.
- 'Leviathan'**, ocean liner; before World War I was German liner *Vaterland*; acquired by United States; scrapped 1937.
- Levin, Meyer** (born 1905), journalist and novelist, born Chicago, Ill. ('The Old Bunch' and 'Citizens', novels with Chicago setting; 'Yehuda' and 'My Father's House', novels about Palestine).
- Levine** (*lè-vên'*), **Philip** (born 1900), American bacteriologist and serologist, born Kletsk, Russia; director of biological division, Ortho Research Foundation, Raritan, N.J., from 1944; his research on Rh factors contributed greatly to success of blood transfusions used to save babies at birth.
- Levinson, Salmon Oliver** (1865-1941), lawyer and advocate of peace, born Noblesville, Ind.; leader of movement for outlawry of war; author of plan for readjustment of German reparations, allied debts, and world peace (1927).
- Lévis** (*lè-vè'*), Quebec, Canada, important port and strongly fortified old town on St. Lawrence River opposite Quebec (city); pop. 13,162; large graving dock and shipyard; lumber, machinery, cigars: *map* C-75
- Levites**, tribe of Israelites J-352
- Leviticus**, the 3d book of the Old Testament, containing the ceremonial laws of the priests.
- Levittown, N. Y.**, residential village on Long Island, 6 mi. e. of Mineola; estimated pop. 40,000; unincorporated housing development of Levitt and Sons, Inc., Manhasset, N. Y., motivated by veterans' housing demands; begun 1947 and built with amazing speed by mass production methods.
- Levittown, Pa.**, private housing project 8 mi. from Trenton, N. J.; begun 1951 by Levitt and Sons, Inc., builders of Levittown, N. Y.; to include 16,000 homes in identifiable neighborhoods; conspicuous example of city planning to meet all community needs.
- Levnirotation.** *See in Index* Laevorotation
- Levulose**, or fructose S-446, 447. *See also in Index* Fructose
- Lewes** (*lè'is*), **George Henry** (1817-78), English philosopher and critic; founded and edited *Fortnightly Review*
- George Elliot** and E-330-1
- Lewes, Del.**, resort city on Delaware Bay; pop. 2904; founded 1631 by Dutch as Fort Opdike, first settlement in Delaware; scene of first and last naval battles of Revolution, and other historic events: D-58, F-111, *map* D-53
- Lewes, England**, county seat, East Sussex, 45 mi. s. of London; pop. 13,104; *map* B-325
- battle of** (1264) M-379
- Lewes River**, the upper course of the Yukon Y-348, *maps* C-68, 80
- Lewis, Andrew** (1720?-81), American soldier, born Ireland; brother of Charles Lewis; major in Washington's Virginia regiment; brigadier general Continental army
- victory of Point Pleasant** V-490
- Lewis, Cecil Day-**. *See in Index* Day-Lewis
- Lewis, Charles** (died 1774), American pioneer soldier in Virginia; brother of Andrew Lewis
- death** V-490
- Lewis, Charles** (1786-1836), English bookbinder B-241
- Lewis, Clive Staples** (born 1898), writer, born Belfast, Northern Ireland; lecturer on English literature, Magdalen College, Oxford University, England; known for scholarly, philosophical, and religious books ('Allegory of Love'; 'Screwtape Letters'; 'Problem of Pain'; 'Miracles').
- Lewis, Dominic Bevan Wyndham** (born 1894), English author; of an old Welsh family; columnist on *London Daily Express*; contributor *Daily Mail*; his studies and writings chiefly concerned with Middle Ages ('François Villon'; 'King Spider'—a life of Louis XI of France).
- Lewis, Elizabeth Foreman** (born 1892), writer, born Baltimore, Md.; missionary teacher in China; Newbery medal (1933) for first book 'Young Fu of the Upper Yangtze' ('Homing, Girl of New China'; 'Portraits from a Chinese Scroll').
- Lewis, Francis** (1713-1802), signer of Declaration of Independence as N. Y. delegate; born Wales; a founder of "Sons of Liberty" signature reproduced D-37
- Lewis, Glibert Newton** (1875-1946), chemist, born Weymouth, Mass.; taught chemistry at Harvard University, Massachusetts Institute of Technology, and (after 1912) University of California; proposed (1916) his theory of atomic structure.
- Lewis, Isaac Newton** (1858-1931), U.S. Army officer, born New Salem, Pa.
- inventor of machine gun** M-9
- Lewis, John** (about 1678-1745), American pioneer, born in Ireland; first white settler of Augusta County, Va.
- Lewis, John Llewellyn** (born 1880), American labor leader L-175, L-71, R-209, T-198, *picture* L-175
- Lewis, Matthew Gregory** (1775-1818), English romance writer and dramatist, nicknamed "Monk" after his most popular romance 'Ambrosio, or the Monk', which was suppressed; later reprinted in expurgated form: E-379
- Lewis, Meriwether** (1774-1809), American explorer L-176-8, *pictures* L-176-7
- Lewis and Clark Expedition** L-176-7, *pictures* L-176-7
- national monument** N-36, *map* N-18
- Lewis, Sinclair** (1885-1951), American novelist L-175-6, A-230d, N-311, *picture* N-310
- Lewis, William Berkeley** (1784-1866), friend, adviser, and campaign manager of Andrew Jackson and member of famous "Kitchen Cabinet."
- Lewis, Wyndham** (born 1884), English author and artist, born in Maine; brought up in England; leader of vorticism painters ('Tarr', novel; 'Time and Western Man', philosophy; 'The Revenge for Love', a political satire; 'Rotting Hill', short stories).
- Lewis and Clark Centennial Exposition**, also called American Pacific Exposition, held June 1 to Oct. 15, 1905, in Portland, Ore., to celebrate 100th anniversary of exploration of the Oregon country; cost about \$7,000,000; attendance 2,545,509.
- Lewis and Clark College**, at Portland, Ore.; Presbyterian; chartered 1867; opened as Albany College 1867; name changed 1942; arts and sciences; graduate school.
- Lewis and Clark Expedition** (1804-6)
- L-176-7, F-38, map U-378, pictures** L-176-7
- Idaho I-23**
- Lewis Carroll.** *See in Index* Carroll, Lewis
- Lewis Institute.** *See in Index* Illinois Institute of Technology
- Lew'istite**, a poison gas C-208
- Lewis machine gun** M-9
- Lewisohn, Ludwig** (born 1883), American writer, born Berlin, Germany; autobiographical books show his attempted complete assimilation in Nordic civilization, his disappointment, and return to identification with Judaism (autobiography, 'Up Stream'; novel, 'The Island Within'; criticism, 'The Story of American Literature').
- Lewisohn Stadium**, in New York City; belongs to and is on the campus of the City College of the City of New York; site of summer concerts.
- Lewiston, Idaho**, city on Snake and Clearwater rivers, 90 mi. s.e. of Spokane, Wash.; pop. 12,985; mining, lumber, wheat, livestock, and fruit: *maps* I-20, U-252
- Lewiston, Me.**, city on Androscoggin River opposite Auburn, 30 mi. n. of Portland; pop. 40,974; textiles, shoes, brass and iron foundry products, electronic tube and lighting equipment; Bates College: M-55, *maps* M-53, U-253
- Lewistown, Mont.**, city in center of state in farming, stock-raising, oil, and mining district (gold, coal, silver, gypsum); pop. 6573; *map* M-375
- Lewistown, Pa.**, borough on Juniata River 42 mi. n.w. of Harrisburg; pop. 13,894; iron and steel products, artificial silk, hosiery, flour, dairy products, silica brick: *map* P-182-3
- Lewis-with-Harris Island**, in Hebrides H-327, *map* B-324
- Lex Caenuleia**, Roman law R-183
- Lex Hortensia**, Roman law R-184
- Lexington, Ky.**, wholesale and manufacturing center 73 mi. s. of Cincinnati, Ohio, in bluegrass region; pop. 55,534; tobacco market; state university, Transylvania College, and College of the Bible: K-24, *maps* K-31, U-253
- Lexington, Mass.**, town 11 mi. n.w. of Boston; pop. of township, 17,335; scene of first battle of Revolution (Lexington and Concord): L-178, *map, inset* M-132, *picture* M-123
- Lexington, N. C.**, city 20 mi. s. of Winston-Salem; pop. 13,571; settled in 1775; flour and cotton mills: *map* N-274
- Lexington, Va.**, in farming district 30 mi. n.w. of Lynchburg; pop. 5976; Washington and Lee University, Virginia Military Institute; tombs of Stonewall Jackson and Robert E. Lee: *map* V-486, *pictures* V-492
- 'Lexington'**, airplane carrier, *picture* N-83
- Lexington and Concord**, battle of L-178, *pictures* R-126, C-430
- Paul Revère's ride** R-119, *picture* R-119
- Lex Valeria**, Roman law R-182-8
- Ley, Robert** (1890-1945), German Nazi official; committed suicide when captured at end of war: G-99
- Leyden, Lucas van.** *See in Index* Lucas van Leyden
- Leyden, or Leiden**, Netherlands, famous old city on Old Rhine, 22 mi. s.w. of Amsterdam; pop. 86,914; birthplace of Rembrandt: N-120, *maps* B-111, E-424
- Dutch home of Pilgrims** M-145
- siege** (1574) N-120. *See also in Index* Siege, table
- university** U-404
- Leyden jar** E-307

- oscillating discharge R-34
- Leyendecker, Joseph Christian (1874-1951), American artist, born Germany; noted for illustrations for magazine covers and advertisements.
- Leyte (*lā'tā*), one of Philippine Islands; 2785 sq. mi.; pop. 835,532; hemp, sugar, sulfur; cap. Tacloban (pop. 31,000); *maps* P-195, A-407
- World War II W-268, 291
- Lhasa, or Lassa (*lās'ā*), capital of Tibet; in s.e.; pop. 20,000; T-127, 129, *maps* C-259, A-407, *picture* T-129
- Lhasa apso, terrier, native of Tibet, *table* D-118b
- Lhevlnne, Joseph (1874-1944), Russian pianist; U. S. debut 1906; taught in Berlin, Germany, later in New York City.
- Liabilities, of banks B-47, 48
- Liability account B-229
- Llakoura (*lyā'ka-ra*), modern name for Mt. Parnassus.
- Liao (*lyou*), river of Manchuria; rises in Great Khingan Mts., flows e. and s. to Gulf of Liaotung; M-72, *map* M-72
- Liaoning (*li-ou'ning*'), former province of s. Manchuria; area was about 124,000 sq. mi.; pop. (1926 estimate) 13,775,000; cap. was Mukden (Shenyang). Liaoning formed, with Heilungkiang and Kirin, the Three Eastern Provinces of historic Greater China. In 1934, under Manchukuo regime, Liaoning was divided into several provinces; reconstituted briefly, with shrunken area, by Nationalists after World War II; this remnant divided (1949) by Communists into Liaosi and Liaotung provinces.
- Liaosi (*li-ou'shō'*), province of s.w. Manchuria, w. of Liao River and on n. shore, Gulf of Liaotung, Yellow Sea; area about 25,000 sq. mi.; pop. 7,000,000; cap. Chinchow; soybeans, corn, millet, kaoliang; coal, lead, molybdenum; province was formed 1949 from s.e. Liaopeh and w. Liaoning provinces; M-72
- Liaotung (*li-ou'dung'*), province of s. Manchuria; s. part of province includes all the Liaotung Peninsula except Port Arthur-Talien (Dairen) administrative district; area about 40,000 sq. mi.; pop. 11,000,000; cap. Antung. Liaotung province is the main industrial area of Manchuria; contains the great manufacturing city, Mukden (Shenyang), supplied with coal from Fushun and steel from Anshan and Penki. The province was formed 1949 from Antung province and e. Liaoning province; M-72
- Liaotung Peninsula, Manchuria, projects s.w. into Yellow Sea between gulfs of Liaotung and Korea; Port Arthur at tip; C-280, 281, M-75
- Russo-Japanese War R-296
- Liao-yang (*li-ou'yāng'*), city in Manchuria on railroad from Mukden (Shenyang) to Port Arthur (Lushun); pop. about 100,000; situated in Manchuria's principal cotton-growing area; taken by Japanese (1904) in Russo-Japanese War.
- Liaquat Ali Khan. *See in Index* Khan, Liaquat Ali
- Libard River, Canada, 2d largest tributary of Mackenzie River; rises in s. Yukon Territory and flows through n. British Columbia in a n.e. direction; enters Mackenzie at Fort Simpson, about 150 mi. west of Great Slave Lake; *maps* C-68, 80
- Liatriis (*li-ā'tris*), or blazing star, a genus of perennial plants of the composite family, native to North America. Tall wandlike flower spikes, purple or white, rise from clusters of narrow, ribbed leaves. Also called gayfeather and button snakeroot.
- Libau, Latvia. *See in Index* Lepaya
- Libbey, Edward Drummond (1854-1925), glass manufacturer, born Chelsea, Mass.; founded Libbey Glass Company at Toledo, Ohio, 1888; G-125
- Libby, W(illard) F(rank) (born 1908), chemist, born Grand Valley, Colo.; taught chemistry at University of California 1933-45; professor Institute for Nuclear Studies, University of Chicago, 1945-54; took leave of absence to become member of Atomic Energy Commission; G-60, *picture* A-299
- Libby Prison, prison for captured Union officers at Richmond, Va., hastily established in Libby and Son's tobacco warehouse during Civil War; moved to Chicago 1889 and became the Libby Prison Museum; torn down 1899; Libby Prison bricks used in North Wall of Civil War Room in Chicago Historical Society building.
- Libel, in law. *See in Index* Law, table of legal terms
- Liberal arts college of U-400, C-384
- medieval universities U-404
- Liberal party (Canada) C-99, 100, 102
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- Laurier leads L-138
- Mackenzie King K-45
- Liberal party (Great Britain) P-360, E-369c
- Churchill C-305
- Gladstone G-116, 118
- Irish question G-118, I-230a
- Lloyd George L-285-6
- reforms E-369d-e, 370
- Russell R-255
- Liberal Republican party (U. S.), formed 1872 by Republicans opposed to political abuses under President Grant; nominated candidates 1872 and 1876
- Horace Greeley G-213
- Schurz a leader H-297
- Liberal Unionist party (Great Britain) C-182
- 'Liberator', abolitionist paper G-26, 27
- Liberator, title given Simón Bolívar B-221-2
- Liberec, German Reichenberg, Czechoslovakia, city in n. Bohemia; pop. 66,803; *maps* C-535, E-424
- Libéria, Negro republic on w. coast of Africa; 43,000 sq. mi.; pop. 1,600,000; cap. Monrovia; L-178, *map* A-46
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- relationships in continent, *maps* A-46-7, 41-2, 39, 51
- Liberty. *See also in Index* Freedom of speech; Freedom of the press; Religious liberty
- birth of democracy W-209-10, D-63
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- Henry, Patrick H-340
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- Mill, John Stuart, on E-382
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- Paine, Thomas P-19b
- Western liberal traditions W-209-11, 212
- 'Liberty', sloop belonging to John Hancock H-254
- "Liberty, Equality, and Fraternity" F-291
- Liberty, Statue of, in New York Harbor L-179, B-61, N-215, *map* B-329, *pictures* L-179, N-216
- national monument N-38c, *map* N-18
- Liberty Bell D-35, *picture* D-34
- Liberty bonds (U. S.), in World War I W-236
- selling campaign, *picture* W-235
- Liberty cap, symbol of freedom which appears on Goddess of Liberty and on many coins and coats of arms; a conical, close-fitting cap, with top drooping forward. It was worn by ancient Phrygians and was placed by Greeks and Romans upon head of a freed slave; as *bonnet rouge* (*bō-nē' ryzh*), or red cap, became famous during French Revolution.
- Liberty Island, in New York Harbor. *See in Index* Bedloe's Island
- Liberty party (U. S.) C-331
- Liberty Tree flag (1776) F-130c, *color picture* F-128
- Libia. *See in Index* Libya
- Libra (*lī'bra*), unit of weight W-86-7
- Libra, also Balance, or Scales, a sign of the zodiac Z-352, *charts* S-377, A-434, *picture* Z-352
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 Libration, in astronomy, an apparent slow balancing movement of a heavenly body on each side of its mean position
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 Libretto. See in Index Music, table of musical terms and forms
 Libreville, capital of the territory Gabon, in French Equatorial Africa; pop. 17,868; important seaport on Gulf of Guinea; founded by the French 1849: map A-46
 Libya (*līb'ī-ā*), Italian Libia (*lē'byā*), officially United Kingdom of Libya, in n. Africa; area 680,000 sq. mi.; pop. 1,060,922; caps. Beagasi and Tripoli: L-218-19, maps A-46, P-156, pictures L-218-19
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 Lichfield, England, city in Staffordshire, 15 mi. n. of Birmingham; pop. 10,624: map, inset B-324
 birthplace of Dr. Johnson J-360
 Lichine (*lī-shēn'*), David, real name Lichtenstein (born 1910), American dancer and choreographer, born Russia; in U.S. after 1933; danced with Anna Pavlova, with Ballet Russe de Monte Carlo and the Ballet Theater: B-28a
 Licinian laws, six laws of ancient Rome passed 367 B.C. in tribuneship of Gaius Licinius; practically ended the struggle between patricians and plebeians: R-184
 Licinius, Flavius Galerius Valerius (320?-324), Roman emperor, 307-323; defeated Maximinus and became sole ruler in East; married Constantine's half-sister; executed for treason.
 Lick, James (1796-1876), philanthropist, born Frederickburg, Pa.; established Lick Observatory in California; buried in vault under its large telescope.
 Licking River, rises in Cumberland Mts. in e. Ky., and flows n.w. 220 mi. to Ohio River: maps K-23, 31
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 Licorice, or liquorice (*līk'ō-ris*), a plant L-221
 Lictor (*līk'tōr*), official attendant of magistrates in ancient Rome; a dictator had 24 lictors; a consul 12, a praetor 6, a praetor 2. They executed orders, inflicted punishment on offenders; carried fasces.
 Liechi. See in Index Ouricury
 Lid'dell, Henry George (1811-98), dean of Christ Church College, Oxford University, England 1855-91; with R. A. Scott prepared 'Greek Lexicon' (1843), still used. His daughter Alice was original of 'Alice in Wonderland'.
 Lidice (*lī-dē't'sē*), Czechoslovakia C-536
 Lido (*lī'dō*), Venice, Italy V-445
 Lie (*lī*), Jonas (1833-1908), Norwegian novelist, friend of Ibsen; uncle of Jonas Lie; a realist whose insight into character is softened by humor and sympathy ('The Visionary'; 'The Commodore's Daughter'; 'Niobe'; 'The Pilot and His Wife').
 Lie, Jonas (1880-1940), American painter, born Norway, nephew of Jonas Lie; landscapes and city scenes ('Brooklyn Bridge'; 'Silver Morn'; 'The Ice Harvest').
 Lie, Trygve (*trīg'vū*) (born 1896), Norwegian statesman, born Oslo; legal adviser to Labor party 18 years; after 1935 minister of foreign affairs; secretary general of the United Nations Feb. 1, 1946-51, re-elected 1951, but resigned 1952; wrote 'In the Cause of Peace'.
 Liebermann (*lī'bēr-mūn*), Max (1847-1935), German painter, born Berlin; an exponent of impressionist school in Germany; ('Jesus Among

the Scribes'; 'Spinners'; also landscapes and portraits).
 Liebig (*lī'bīk*), Justus, baron von (1803-73), German chemist and teacher L-221
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 Liebknecht (*lēp'knēkt*), Karl (1871-1919), German Socialist leader; son of Wilhelm Liebknecht, friend of Marx and Engels; only member of Reichstag to oppose World War I; shot by soldiers while on his way to prison after Spartacist uprising Spartacans S-330
 Liebknecht, Wilhelm (1826-1900), German socialist and journalist; father of Karl Liebknecht; with August Bebel helped form German Social Democratic party; writing had great influence.
 Liebman, Joshua Loth (1907-48), rabbi and writer, born Hamilton, Ohio; rabbi of K.A.M. Temple, Chicago, Ill., 1934-39; rabbi of Temple Israel, Boston, Mass. 1939-48 ('Peace of Mind').
 Liechtenstein (*līk'tēn-shtēn*), principality of Europe on upper Rhine; borders Switzerland S. of Lake Constance; cap. Vaduz; area 62 sq. mi.; pop. 13,757: L-221, maps S-475, E-416, 425, picture L-221
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 Lie detector L-221-2, picture L-222
 Liège (*lī-āzh'*), chief manufacturing and trade city of Belgium; pop. 156,208: L-222, maps B-111, E-416, 425
 Charles the Bold takes C-195
 siege of (1914) L-222, W-220
 Liegaitz (*līg'gāits*), Polish Legnica (*līg-nētsā*), Poland, former Prussian manufacturing and trade town in Silesia, 40 mi. n.w. of Breslau; pop. about 56,000; decisive victory of Frederick the Great over Austrians (1760); included in Poland since 1945: maps G-88, E-424
 Lien, in law C-510. See also in Index Law, table of legal terms
 Liepāja, Latvia. See in Index Lepaya
 Lieutenant (*lī-tēn'ānt*)
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 U.S. Army, tables A-380, 384: insignia, picture U-238
 U.S. Marine Corps, table A-384
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 Lieutenant, junior grade, U. S. Navy N-89, table A-384
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 Lieutenant colonel
 U.S. Air Force, table A-384: insignia, picture U-238
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 Lieutenant commander, in U. S. Navy N-89, tables A-384, N-89
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 Lieutenant general
 U.S. Air Force, table A-384: insignia, picture U-238
 U.S. Army, tables A-380, 384: insignia, picture U-238
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 Lieutenant governor, an officer authorized to perform the duties of a governor during his absence or to take his place in case of death or resignation
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Key: cape, dt, fār, fāst, whqt, fāll; mē, yēt, fērn, thēre; ice, bīt; rōw, wōn, fōr, nōt, dō; cūrc, būt, rīde, full, bārūn; out;

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Life buoy, or **life preserver**, a float which will support one or more persons in water; usually made of cork, balsa, or kapok
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Liffey (liff'i) River, Ireland, 70-mile-long stream rising s. of Dublin and flowing w., n., and e. in a semicircle into Dublin Bay: *map* B-325
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- Lifting** by one's boot straps M-161
Ligament (from Latin *ligare*, "to bind"), a tough, fibrous band which connects bones or supports viscera S-192
Ligan. *See in Index* Flotsam
Lig'gett, Hunter (1857-1935), U. S. Army officer, born Reading, Pa.; in World War I commanded 1st Army, A.E.F.; retired 1921; made lieutenant general 1930 ('Commanding an American Army'; 'Recollections of the World War').
Light L-227-35, *pictures* L-227-31, 233-5, *Reference-Outline* P-237. *See also in Index* Electric lighting; Gas, for heating and lighting; Lamps; Lighting; and principal topics below
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Lightner Museum of Hobbies, deeded in trust to the city of St. Augustine, Fla., 1947 by Otto C. Lightner (1887-1950), founder-publisher of *Hobbies* magazine, born Norwich, Kan.; museum houses thousands of varied collections from all over the world, including cut glass, metal match boxes, chandeliers, old musical instruments, and costumes; opened to public 1948.
Lightning L-240-1, *pictures* L-240-1
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Lightning bug, a firefly F-92
Lightning cone, or left-handed whelk (*Busycon perversum*), snail shell, *color picture* S-139a

Lightning rod, for protecting buildings from lightning L-241
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Lightning war, or Blitzkrieg W-248
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Light opera O-394-8, *pictures* O-395-7
Lightship L-236, 238
Light soil S-228
'Light That Failed, The', a story by Kipling of an artist-journalist who becomes blind K-49
Light therapy, also called phototherapy and heliotherapy, treatment of disease with light rays. *See also in Index* Ultraviolet rays mercury-vapor lamps Q-3
Lightweight, in boxing B-267
Light-year, distance traveled by light in a year A-443, S-371
Lignin, or lignone, complex chemical substance which, with cellulose, forms the woody structure of plants and trees; used as basis of certain new plastics: L-350
 percentage in tree W-186
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Lignite (*lign'it*), fuel midway between coal and peat C-363
 United States deposits: North Dakota N-281, 282, *picture* N-292; Texas T-78
Lignocellulose, from wood P-304
Lignum vitae (*lign'um vi'te*), a tropical tree of the genus *Gualacum* of the caltrop family, native to s. Florida, Central and South America. Grows to 30 ft.; leaves oblong, leathery; flowers blue, rarely white. Wood extremely hard, fibers much interwoven, heavy, contains a gum-resin that acts as a natural lubricant. Used for propeller-shaft bearings of ships and other bearing parts permanently under water, pulleys, and mallet heads. Gualac gum or resin collected from living tree is used in medicine.
Ligny (*lên-yê'*), village in Belgium 25 mi. s.e. of Brussels; victory of Napoleon over Prussians under Blücher (1815) prelude to battle of Waterloo: W-66
Ligueur, Pierre Laeclède. *See in Index* Laeclède, Pierre
Ligugé, monastery of M-355
Liguria (*li-gû'ri-q*), in ancient Roman days, the part of n. Italy between the Po and the Mediterranean, and from the Gulf of Genoa to the Gaul border, or even at one time to the Rhone; also region of modern Italy; 2091 sq. mi.; pop. 1,557,833; cap. Genoa: I-265-6, *map* I-263
Ligurian Republic, name given to the democratic government instituted in Genoa 1797 by Napoleon I; incorporated in France 1805.
Ligurians, a pre-Roman and pre-Tuscan people, organized in tribes; they were considered by some authorities the aboriginal inhabitants of n. Italy.
 in France F-258
Ligurian Sea, *maps* I-262, 263. *See also in Index* Genoa, Gulf of
Li Hung-chang (*lê hûng'-gâng'*) (1823?-1901), Chinese statesman; aided General Gordon in suppressing the Taiping rebellion; bore chief burden of Sino-Japanese War of 1894: for many years "buffer" between China and outside world.
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Lilac, shrub of olive family L-242, *pictures* L-242
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Liliaceae (*li-li-â'sê-ê*), the lily family.
Lillencron (*li-li-ên-krôn*), Detlev, baron von (1844-1909), German

soldier, lyric poet, and realistic novelist ('Adjutantennitte', poems: 'Poggfred', humorous epic; 'Unter flatternden Fahnen', 'Krieg und Frieden', short stories): G-85
Lillenthal (*li-lên-thäl*), David Eli (born 1899), lawyer, born Morton, Ill.; practiced law in Chicago 1923-31; director of Tennessee Valley Authority 1933-41, chairman 1941-47; chairman United States Atomic Energy Commission 1947-50.
Lillenthal (*li-li-ên-thäl*), Otto (1848-96), German inventor; one of the early experimenters in aviation; attempted to imitate flight of birds gliders A-101, *picture* A-101
Lilith (*li-lith* or *li-lith*), in Hebrew folklore, a demon in the form of a beautiful woman who works mischief at night, especially among children; said to have been the first wife of Adam.
Liliuokalani (*lê-lê-q-ô-kâ-lâ'-nê*), (1838-1917), queen of Hawaiian Islands 1891-93; wrote words of famous song 'Aloha Oe': H-291
Lille (*lêl*), manufacturing city of n. France on Deule River; pop. 179,778: L-242, *maps* F-259, E-416, 425 recovered by Allies W-230
Lille University (founded 1530) L-242
Lillie, Beatrice (Lady Peel) (born 1898), actress, born Toronto, Ontario, Canada; made stage debut, London, England, 1914; first N. Y. appearance, André Charlot's Revue, 1924; best known for her roles as a comedienne; appeared also in motion pictures, radio, and television.
Lillie, Gordon W. (Pawnee Bill) (1860-1942), pioneer, born Bloomington, Ill.; official interpreter to Pawnee Indians; managed Pawnees in first Buffalo Bill Wild West Show 1883-86; later professional showman for years; led Oklahoma land rush 1889; noted for work among Pawnee Indians and for activities to perpetuate buffalo.
Lilliputians (*li-li-pû'shânz*), in Jonathan Swift's 'Gulliver's Travels', tiny inhabitants of Lilliput G-229, S-470
Lilly the Euphuist. *See in Index* Lyly
Lily, a plant L-242-3, *pictures* L-243, F-182
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 wild yellow lily, *color picture* F-178
 wood, or wild orange-red, *color picture* F-175
 yellow snow lily, *color picture* P-287
Lilybaeum (*li-li-bê-um*), ancient city on Lilybaeum Promontorium (Cape Boeo), w. extremity of Sicily, founded by Carthaginians; starting point of Romans on African military expeditions; modern Marsala; pop. 24,650; famed wine: *maps* G-197, E-425
Lily family, or Liliaceae (*li-li-â'sê-ê*) L-243
Lily of the Mohawks. *See in Index* Tekakwitha
Lily of the valley L-243, *pictures* L-243, F-181
Lima (*li-mâ*), Ohio, industrial city on Ottawa River, 70 mi. s. of Toledo; pop. 50,246; locomotives, steel products, automobile bodies, neon signs, cigars; limestone quarries; state hospital for criminal insane: *maps* O-356, U-253
Lima (*lê-mâ*), capital of Peru; pop.

628,821: L-243, *maps* S-252, P-164, *pictures* L-115, 121
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Lima, Declaration of (1938) L-121
Lima (*li-mâ*) bean B-84
 when and how to plant, *table* G-19
Liman von Sanders, Otto (1855-1929), Prussian general; in command of Turkish army which defeated allied attack on Gallipoli peninsula 1915; in 1918 his army in Palestine was crushed by General Allenby.
Limber pine, evergreen tree (*Pinus flexilis*) of pine family, found at high altitudes in scattered localities from Alberta to Mexico and California. Grows to 50 ft.; trunk short, thick. Leaves in fives, to 3 in. long, dark yellowish green, bunched at ends of branches. Cones oval, to 6 in. long, light brown.
Limbourg, Pol, Hermann, and Hannequin, de, French painters, three brothers, of 15th century; Pol was most talented; chief work 'Book of Hours of Duc de Berry', an illuminated manuscript in which snow scenes and other landscapes dotted with figures were painted with a remarkable sense of design and of realism; said to have established a typical French tradition of landscape painting.
Limburger cheese, named for Limburg, Belgium; manufactured in northern European countries and United States: C-207
Lime, chemical compound of calcium L-244. *See also in Index* Limestone borate minerals M-265
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 slaked L-244
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Lime-julcers, British sailors L-244
Limelight, use in stage lighting caused it to be metaphoric expression for prominence L-244
Limequat, a citrus fruit L-244
Limerick, county of s.w. Ireland, in province of Munster; area 1037 sq. mi.; pop. 141,239; comprises most of Golden Vale, most fertile district in all Ireland: *map* I-227
Limerick, Gaelic *Limneach* (*lîm'nâk*), Ireland, county borough in Limerick County; pop. 50,820; chief port on Ireland's w. coast; at head of Shannon River estuary; lace, flour, salmon, bacon; gave name to limerick verse: *map* B-325, *picture* I-229
Limerick, nonsense verse L-244
 Edward Lear L-142, L-244
Limerick, Treaty of (1691). *See in Index* Treaties, *table*
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 Yellowstone National Park, *picture* Y-337
- Limestone College, at Gaffney, S. C.; for women; established 1845; arts and sciences.
- Lime tree, citrus tree yielding a small green fruit L-244
 introduced into Europe C-522
- Lime tree, the linden tree L-254
- Lime water, solution of slaked lime in water L-244
- Limeys, British sailors L-244
- Limitation of armaments. *See in Index* Armaments, limitation of
- Limitations, Statutes of, laws in England and U. S. by which right of bringing action is limited to a fixed period after the events on which the action is based.
- Limited access highway R-158b
 cloverleaf, *picture* R-158c
- Limited liability, in business C-487
- Limited monarchy D-65, G-146
- Limmat (līm'ät), river of Switzerland; rises at n. end of Lake Zurich, flows n.w. 18 mi. to Aare River; upper course called Linth at Zurich Z-366
- Limoges (lê-môch), town in w.-central France on Vienne River; pop. 99,535; taken by Black Prince 1370; porcelain manufacturing center: *maps* F-270, E-416, 425
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- Limon (lê-môn'), Costa Rica, major seaport, on Caribbean; pop. 11,310; ships coffee and bananas: *maps* C-172, N-251
- Limon Bay, Panama P-62
- Limouite (līmō-nīl), a yellowish iron ore I-237, M-262, *table* M-176
- Limousin (lê-mô-zān), historic French province, *map* F-270
- Limpet, a gastropod mollusk which clings to rocks M-334
 plate limpet (*Acmæa patina*): shell, color *picture* S-139b
- Limpkin, a large rallike bird (*Aramus pictus pictus*) closely related to cranes; plumage dark brown with white markings; frequents southern swamps; feeds on aquatic insects and frogs; its mournful wail suggested its nicknames "the lamenting bird" and "mad widow."
- Limpopo (līm-pō-pō) River, in e. part of South Africa; forms n. boundary of Transvaal, then flows s.e. through Mozambique 1000 mi. into Indian Ocean; scene of Kipling's "Elephant's Child": *maps* E-199, A-47, 42
- Linaceae. *See in Index* Flax family
- Linacre (līn'q-kēr), Thomas (1460?-1524), English humanist, physician and divine; physician to Henry VII and Henry VIII; helped found College of Physicians, of which he was first president; but famed chiefly as classical scholar.
- Linanthus, low growing annual plants of the phlox family, native to western North America. Leaves threadlike; flowers tiny starlike funnels or saucers, white through purple, completely cover the plant in a mass of bloom; used in rock gardens; often called ground pink.
- Linaria, a genus of plants of the figwort family, including the toadflax, or butter-and-eggs, and Kenilworth ivy. *See also in Index* Butter-and-eggs; Kenilworth ivy
- Lincoln, Abraham (1809-65), 16th president of United States L-245-51, *pictures* L-245-9, 251. *See also in Index* Civil War, American administrations (1861-65) L-248-50
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 storyteller, *picture* F-207
 tomb at Springfield, Ill. S-357
 Whitman's poems on W-131
 wife and sons W-128-128a, L-247, *pictures* W-128a, L-248
- Lincoln, Benjamin (1733-1810), American general, prominent in Revolutionary War; secretary of war 1781-84; commanded Massachusetts militia and suppressed Shays' Rebellion (1787).
- Lincoln, Joseph C. (rosby) (1870-1944), novelist and short-story writer, born Brewster, Mass.; wrote with kindly humor of quaint Cape Cod characters ("Cap'n Eri", "Rugged Water", "Queer Judson", "The Aristocratic Miss Brewster", "Blowing Clear", "Cape Cod Yesterdays").
- Lincoln, Mary Todd (1818-82), wife of President Lincoln W-128-128a, L-247, *pictures* W-128a, L-248
- Lincoln, Robert Todd (1843-1926), American lawyer, son of Abraham Lincoln; secretary of war 1881-89; minister to Great Britain 1889-93: W-128a, *picture* L-248
- Lincoln, Thomas (1778?-1851), father of Abraham Lincoln L-246-7
- Lincoln, or Lincolnshire, agricultural county in e. England; 2664 sq. mi.; pop. 706,574; cap. Lincoln: *map* E-347
- Lincoln, England, capital of Lincoln County, on Witham River 125 mi. n. of London; pop. 69,412; Roman remains; livestock market, iron products: *map* B-325
 cathedral, *picture* E-352: contains copy of Magna Carta M-41
- Lincoln, Ill., industrial city 28 mi. n.e. of Springfield in agricultural and coal-mining region; pop. 14,362; named for Abraham Lincoln; Lincoln College: *map* I-36
- Lincoln, Neb., state capital, in s.e.; pop. 98,884: L-251, *maps* N-103, U-252-3
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- Lincoln College, Oxford University, England O-434
- Lincoln Continental, an automobile, *picture* A-505
- Lincoln-Douglas debates L-251-2, L-248, D-125
- Lincoln Highway, U.S., a coast-to-coast national highway R-158e
- Lincoln Memorial, Washington, D. C. W-32, N-38d, L-251, *pictures* L-250, W-33
 Gettysburg Address, *picture* L-250
 "Seated Lincoln", *picture* L-251
- Lincoln Memorial Garden, Springfield, Ill. S-358
- Lincoln Memorial University, at Harrogate, Tenn.; chartered 1897; arts and sciences, business administration, music, physical education.
- Lincoln Park, Mich., suburb of Detroit, about 10 mi. s.; pop. 29,310: *map*, inset M-227
- Lincoln's birthplace, national historical park in Kentucky N-30, *map* N-18, *pictures* K-34
- Lincoln sheep S-138, *picture* A-62
- Lincolnshire, county, England. *See in Index* Lincoln
- Lincoln's Inn Fields, a square in London, England, laid out by Inigo Jones; named for Lincoln's Inn, on e. side, a building occupied by a guild of lawyers
 Old Curiosity Shop, *picture* D-84a
- Lincoln Tunnel, New York City T-209
- Lincoln University, at Jefferson City, Mo.; state control; founded 1866; arts and sciences, journalism; graduate studies; law school in St. Louis.
- Lincoln University, at Lincoln University, Pa.; founded 1854 as Ashmun Institute; arts and sciences; theological seminary affiliated with Presbyterian church.
- Lind, Jenny (1820-87), called "Swedish nightingale," beloved soprano singer; pupil of Adolf Lindblad; toured U.S. 1850-52 under management of P. T. Barnum; married her accompanist, Otto Goldschmidt.
- Lindbergh, Anne Spenceer Morrow (born 1906), aviator and writer, wife of Charles A. Lindbergh; first woman to receive Hubbard gold medal of National Geographic Society 1934 for work as copilot and radio operator: L-253-4
- Lindbergh, Charles Augustus (1859-1924), American congressman L-252
- Lindbergh, Charles Augustus (born 1902), American aviator L-252-4, *pictures* L-252-3
 Maya ruins photographed, *picture* E-455
- Medal of Honor D-38
- New York to Paris flight L-253, *picture* A-102, *table* A-104
 scientific contributions L-253
 "Spirit of St. Louis", *picture* A-102
 transatlantic flight L-253
- Lindblad, Adolf (1801-78), Swedish composer, called "the Schubert of

- the North"; wrote many songs introduced by Jenny Lind, who was his pupil; composed a symphony and an opera 'Fröndörerna'.
- Lindblad, Otto** (1809-64), Swedish composer, particularly of quartets; wrote music for national song 'Ur svenska hjertans djup' (From the Depth of Swedish Hearts).
- Linden, N. J.**, city, suburb of New York City; pop. 30,644; oil, gasoline, liquor: map N-164
- Linden, a shade tree** L-254
- American, pictures** T-181-3
- Linden family, or Tillareae** (tīl-i-ā'-sē-ē), a family of plants, shrubs, and trees; includes basswood, lindens, grewias, jute, Jew'smallow; often called basswood family.
- Lindenwood College, at St. Charles, Mo.**; Presbyterian; for women; founded 1827; arts and sciences.
- Lindsay, Howard** (born 1889), actor director, author, and producer, born Waterford, N.Y.; with Russell Crouse wrote and produced many plays ('Life with Father', in which he also acted; 'Arsenic and Old Lace'; 'State of the Union').
- Lindsay, (Nicholas) Vachel** (1879-1931), poet and lecturer, born Springfield, Ill.; several times wandered through country on foot reciting and selling his verses for bread; wrote virile, rhythmic verse, which he held should be read aloud or chanted: A-230c
- quoted A-230c
- Lindsay, Ontario, Canada**, town on Scugog River 58 mi. n.e. of Toronto in fertile farming area and scenic lake region; pop. 9603; flour, woolen, and lumber mills, machinery factories, chemical works: map C-72
- Lindsey, Benjamin Barr** (1869-1943), judge and social reformer, born Jackson, Tenn.; admitted to Colorado bar 1894; revolutionized methods of handling delinquent children ('Problems of the Children'; 'Revolt of Modern Youth'; 'House of Human Welfare'; 'Companionate Marriage'): J-368
- Lindsey, Parts of**, administrative district in Lincoln County, England, map E-347
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- Line, nautical.** See in *Index* Nautical terms, table
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- Linear measure** M-149, table W-87
- origin of the foot** F-226
- Linear perspective** P-160
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- Line dancing** D-147
- Line drawing** D-138-9
- Persian sketch, 'Camel with Driver'** D-138-9, picture D-139
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- Lincoln-fold carving, on furniture, picture** W-190b
- Line of cleavage, in crystals** C-525
- Line of Demarcation, imaginary line**
- from North Pole to South Pole, 100 leagues w. of Azores; fixed 1493 by Pope Alexander VI: A-188
- Line officer, U. S. Army** A-383
- Line of position, navigation** N-78
- Liners. See in Index** Ocean liner
- Linesman, in football** F-229
- Lines of force, magnetic, imaginary**
- lines along which magnetic force is exerted E-303, 304, 305, M-42
- electric generator and motor, action in** E-290-2
- iron filings show, picture** M-43
- Line squall** W-150
- Linfield College, at McMinnville, Ore.**; Baptist; founded 1858; arts and sciences.
- Ling (ling), Per Henrik** (1776-1839), creator of Swedish gymnastics, head of Royal Gymnastic Central Institute, Stockholm; also poet and playwright.
- Ling, or heather** H-320
- Ling, burbot, or lawyer** (*Lota maculosa*), only member of cod family found exclusively in fresh water.
- Lingenberry (ling'gēn-bēr-i)**, or cowberry, a low-growing shrub (*Vaccinium vitis-idaea*) of heath family, native to n. Europe and Asia. Creeping evergreen; leaves oblong; flowers white or pink in small clusters; fruit small, dark red, oblong, in clusters. Named "lingon" or "kroesa" in Denmark and Sweden. North American variety is smaller; native from Massachusetts to Alaska; also called mountain cranberry and foxberry.
- Lingua franca, a common language** L-98b
- Link, unit of length in surveying** S-458
- Link trainer, a flight trainer used in training airplane pilots, picture** A-540
- Linnitigow (līn-līth'gō)**, Victor Alexander John Hope, 2d marquess of (1837-1952), English political leader, formerly a banker; viceroy and governor general of India 1936-43.
- Linn, a name for the linden tree** L-254
- Linnæa, or twinflower, a delicate, creeping evergreen wild flower** (*Linnæa borealis*) of honeysuckle family, with threadlike, upright flower stalks, each topped with two fragrant drooping, bell-shaped rose or white flowers; named after Linnaeus (Carl von Linné).
- Linné (lī-nā')**, or Linnæus, Carl von (1707-78), Swedish botanist and naturalist L-254-5, B-152
- Linnæus, a small European songbird** (*Carduelis cannabina*) of the finch family, so called because it feeds on the seeds of flax (*Linum*).
- Lino'leum** L-255
- Linotype L-256-9, pictures** L-256-9
- assembling, or composing, matrices** L-257-8
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- distributing matrices** L-258-9
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- Linseed (flaxseed) oil** F-140
- a "drying oil"** F-45
- paints** P-40
- Linsay-woolsey, a cloth** P-263
- Lint, cotton** C-495, 497
- Lintel. See in Index** Architecture, table of terms
- Linters, fibers from cottonseed**
- cellulose, source of R-81, C-162
- uses** C-495, C-162, 163
- Linton, William James** (1812-97), English wood engraver and republican reformer; in later years lived in New Haven, Conn.; considered greatest wood engraver of his day ('Practical Hints on Wood Engraving'); wrote lives of John Greenleaf Whittier and Thomas Paine.
- Linum (lī'nūm)**, the flax genus of herbs; includes the blue-flowered commercial flax (*Linum usitatissimum*); yellow linum or flax (*L. flavum*) and scarlet flax (*L. grandiflorum coccineum*), cultivated in gardens.
- Linyu, China. See in Index** Shan-haikwan
- Liu Yu-t'ang** (born 1895), Chinese philosopher and writer, born Changchow, Fukien province; son of pastor of American Reformed church mission; professor at Peking National University 1923-26; in New York City after 1935; interprets China with urbane humor (nonfiction: 'My Country and My People', 'The Importance of Living', 'On the Wisdom of America'; novels: 'Moment in Peking', 'A Leaf in the Storm', 'Chinatown Family', 'Vermillion Gate') quoted C-274, R-84c-f
- Linz (līnts)**, Austria, Danube River port city 90 mi. w. of Vienna: pop. 184,685; large trade by rail and river; tobacco products, farm implements, boats, cloth: maps D-16, E-416, 425
- Lion L-261, pictures** L-260, Z-354, 359, C-136b, color picture A-37
- altitude range, picture** Z-362
- cat family characteristics** C-135
- distinguished from tiger** T-131, 132
- food in captivity** Z-357
- heraldic device** H-341
- length of life, average, photograph** A-249
- portrayed in art: mosaic, picture** E-6b
- price paid for by zoos** Z-358
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- stories: 'Androcles and the Lion'** L-261; 'Animals Sick of the Plague' F-2-3; 'Fox and the Lion' F-3; 'Lion and the Mouse' F-1
- tamer and lions, picture** C-316
- taxidermist's art, pictures** T-26
- Lion, Gulf of the, also Gulf of Lions**, wide bay of Mediterranean washing most of s. coast of France F-260, maps F-259, E-425
- Lion, or Leo, a sign of the zodiac. See in Index** Leo
- 'Lion and the Mouse, The' fable** F-1
- 'Lion of Belfort', sculpture by Bartholdi** B-61, picture B-61
- Lion of Justice, Henry I, king of England** H-335
- 'Lion of Lucerne', sculpture by Thorvaldsen** T-123, picture T-123
- Lion of the North, name sometimes given to Gustavus II, Adolphus.**
- Lions, Court of, in Alhambra, picture** S-321
- Lions Clubs, International Association of**, formed in 1917, businessmen's clubs devoted to the promotion of high ethical standards and the encouragement of efficiency in business and the professions; each club allows only one active member from each business and profession; motto is "Liberity, Intelligence, Ours N-ation's Safety."
- Lions Gate Bridge, over Burrard Inlet**
- Vancouver, British Columbia, Canada V-437. See also in *Index* Bridge, table
- Lion's heart. See in Index** Physostegia
- Lion's paw** (*Pecten nodosus*), clam shell, color picture S-139a
- Lipari (lī'pā-rē)** Islands, or Aeolian Islands, Italy, group of volcanic

Key: cape, āt, fār, fāst, whāf, fqlī; mē, yēt, fērn, thēre; fce, bīt; rōw, wōn, fōr, nōt, dō; cūre, būt, rjde, fqlī, bārn; out;

- islands in Mediterranean n. of Sicily; 45 sq. mi.; pop. 17,697; largest Lipari; fruit, olives, pumice stone: *maps* I-262, E-425
volcanoes L-138, M-166
Lipase, an enzyme D-91b, *table* E-389
Lipchitz (*lêp-shêts'*), Jacques (born 1891), Polish sculptor; worked chiefly in France; early work influenced by cubists: S-82, 83
'Prometheus Strangling the Vulture', *picture* S-83
Lipins, organic compounds B-145
oxidation B-146
Lipit-Ishtar, Babylonian king
code of law L-139
Liplizan, horse H-428h, *picture* H-428d
Lipkind, William (born 1904), pen name Will, anthropologist and author, born New York City; spent 1938-40 in wilds of central Brazil studying Caraja Indians; wrote for children 'The Two Reds' and 'Finders Keepers', the latter the winner of Caldecott medal 1952 for its illustrations by Nicolas Mordvinoff.
Lipmann, Fritz Albert (born 1899), American biochemist, born Königsberg, Germany (now Kaliningrad, Russia); became U.S. citizen 1944; professor of biological chemistry Harvard University medical school after 1949; for discovering coenzyme A, won 1953 Nobel prize in medicine and physiology (with Hans A. Krebs).
Li Po (*lê pō*), or Li Tai-po (*lê tî-pō*) (701?-762?), Chinese poet, favorite of emperor; wrote exquisite poems about love, wine, and beauties of nature; said to have drowned trying to kiss the moon's reflection at the side of his boat.
Lippe (*lîp'pê*), former state in w. Germany; 469 sq. mi.; 1939 pop. about 190,000; after World War II became part of state of North Rhine-Westphalia.
Lippershey, Jan (died 1619), Dutch optician; made a telescope in 1608, thought to be first made: T-46
Lippi (*lîp'pê*), Filippino (1460?-1505?), Florentine painter, son and pupil of Fra Filippo Lippi and pupil of Botticelli; his work more ornamental than his father's, more realistic and less poetical than Botticelli's ('Vision of St. Bernard'; 'Adoration of the Magi').
Lippi, Fra Filippo (1406-69), Florentine painter, probably the greatest colorist of his day; father of Filippino Lippi; his pictures reveal a strong, naïve nature, with a lively and somewhat whimsical observation
Madonnas M-25
Lippmann (*lêp-mân'*), Gabriel (1845-1921), French physicist, born Holscherich, Luxembourg; won 1908 Nobel prize in physics for method, based on interference, for reproducing colors by means of photography.
Lippmann (*lîp'mân'*), Walter (born 1889), writer, editor, and social philosopher, born New York City; studied at Harvard University under George Santayana and William James; one of founders of *New Republic*; editor *New York World* 1929-31; editorial writer *New York Herald Tribune*; analyzes political and social problems ('A Preface to Politics'; 'Public Opinion'; 'A Preface to Morals'; 'The Good Society').
Lip reading, aid to deaf D-25
Lipschitz, Jacques. *See in Index*
Lipchitz, Jacques
Lip'ton, Sir Thomas (1850-1931), British merchant and yachtsman, born Glasgow, Scotland; son of poor Irish parents; made start by advertising small provision store; developed business until he amassed great wealth and owned large plantations of tea, coffee, and cocoa
America's Cup B-216
Liquefaction, of gases G-30, M-142b, d
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chlorine C-288
helium H-331
LP-Gas G-33, P-173
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drop formation L-262, *diagram* L-264
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wetness explained L-264
wetting agents S-213-14, L-264-5, *diagram* L-263
Liquid air L-265
Liquidambar (*Hamamelidaceae*), deciduous trees of witch-hazel family; native in Asia and America. *See also in Index* Red gum
Liquid assets B-47
Liquid Fuels Act, Synthetic (1944), U.S. P-181
Liquid measure, *table* W-87
Liquorice, or licorice, plant L-221
Liquor laws
foreign P-417
prohibition P-416-17
United States P-416
work of W.C.T.U. W-183
Liquors, distilled A-146
Lira (*lê'râ*), plural lire, (from Latin *libra*, "pound"), the monetary unit of Italy, historical value 5 1/4 cents; but variable in value; at one time worth 19.3 cents. Name also applied to Turkish gold 100-piaster piece, historical value about \$7.45.
Lisa (*lê'sn*), Manuel (1772?-1820), Spanish fur trader; led first important expedition up the Missouri 1807 and built Fort Manuel at mouth of Bighorn River; with Andrew Henry, Jean Pierre Chouteau, and others founded Missouri Fur Company (1808-9) and built Fort Lisa near mouth of Big Knife River in North Dakota; erected Fort Manuel in n. South Dakota 1812; traveled up and down Missouri at least 12 times: F-324, S-305-6
Lis'bon, also Lisboa, capital of Portugal; pop. 783,226: L-266, P-378, 379, *maps* S-312, E-425, A-531, *picture* P-380
Columbus in C-417
earthquake (1755) E-196
Lisgar, John Young, Baron (1807-76), English statesman, born Bombay, India; chief secretary for Ireland, lord high commissioner of Ionian Islands, and governor of New South Wales, Australia; governor general of Canada 1869-70.
Lisle, Leconte de. *See in Index* Leconte de Lisle
Lisle, Rouget de. *See in Index* Rouget de Lisle
Lisle, a hard, twisted thread originally of linen, now often of specially prepared cotton
origin of name L-242
Lisping, in speech C-240c
Lis'ter, Joseph, Baron (1827-1912), English surgeon, born Upton, Essex; developed antiseptic surgery: A-266
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List system, of voting. *See in Index* Proportional representation
Liszt (*lîst*), Franz (1811-86), Hungarian composer L-266, P-251, *picture* L-266
Li Tai-po. *See in Index* Li Po
Litani River, in s. Lebanon; about 90 mi. long: S-487
Lit'any, liturgical prayers in which the clergy leads and the choir or congregation responds (from Latin *litania*, "a prayer"); used in Catholic and in Episcopal and some other Protestant churches.
Litas (*lê'tās*) (plural litai), also lit, the monetary unit of Lithuania since 1922; historical value about 10 cents.
Litchfield, Conn., borough 23 mi. w. of Hartford; pop. 1174; birthplace of Harriet Beecher Stowe, Henry Ward Beecher, and Ethan Allen; first school of law (1784): *map* C-444
first temperance society T-56
Litchi, lichee, or iechee, a Chinese tree (*Litchi chinensis*) having leathery pinnate leaves and delicious strawberrylike fruit; also grown in Cochín-China and Malay Archipelago: N-317
Litr (*lê'têr*), unit in metric system (1.0567 liquid qts.) M-184
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 Lithia (lithium oxide), often used for a combination lithium citrate and other salts to produce effervescence in medical preparations.
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 Lithuania (*lit̃h-ū-ā-ni-a*) (Lithuanian Soviet Socialist Republic). Russia, pop. 2,700,000; cap. Vilnius: L-276, P-343, 344, *maps* R-260, 266-7, E-417
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 Litterae humaniores (*lit̃'ēr-ē hū-mān-i-ō'rēz*) R-104
 Little, Arthur Dehon (1863-1935), chemical engineer, born Boston, Mass.; expert on papermaking; invented processes for chrome tanning, for manufacture of petroleum products and artificial silk, and for electrolytic manufacture of chlorates.
 Little America, Admiral Byrd's base in Antarctica C-373, P-351, *maps* A-259, W-204, *pictures* P-347, 348
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 Little Bear, or Ursa Minor, a constellation, containing the Pole Star, *charts* S-374, 377, 380
 Little Belt, strait between Fünen Island and mainland of Denmark; Swedish army under Charles X marched across it on ice to Fünen in 1658: *map* D-71
 'Little Belt', British sloop W-11
 Little Belt Mountains, range of Rocky Mountains, in Lewis and Clark National Forest, Montana: *map* M-367
 Little Bighorn River, in s. Montana, flows n. across Crow Indian Reservation for 60 mi., enters Bighorn River
 scene of Custer massacre C-531: *map* M-375
 Little blue heron H-351
 'Little Bo-Peep', origin M-406
 'Little Boy Blue', poem by Eugene Field F-64
 Little brown crane C-507
 Little Church Around the Corner, Episcopal Church of the Transfiguration in New York City on 25th St., one door from 5th Avenue; received nickname, 1870, when Joseph Jefferson, arranging funeral for an actor friend was turned away from one church and advised, "There's a little church around the corner that might accommodate you"; nickname persisted and church remained a favorite with theatrical people.
 Little Colorado, or Colorado Chiquito, river in Arizona, a tributary of Colorado River C-414b, *maps* A-352, U-297, C-414b
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 Little Dipper, seven stars corresponding to constellation Little Bear; tip of handle is North Star. *See also in Index* Little Bear
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 'Little Dorrit', novel by Charles Dickens; Little Dorrit is born, brought up, and wed in the prison where her father was confined for debt: D-84a
 Little Egypt, in Illinois I-27
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 Little Falls, Minn., city 84 mi. n.w. of St. Paul; pop. 6717; granite, flour, paper: *map* M-287
 boyhood home of Charles A. Lindbergh L-252
 Little Falls, N. Y., manufacturing city on Mohawk River and Barge Canal
- 20 mi. s.e. of Utica; cascades in river give excellent water power; pop. 9541; knit goods, dairy products, bicycles, machinery, felt shoes; destroyed by Indians and Tories in 1782, resettled in 1790; General Nicholas Herkimer's grave nearby: *map* N-205
 Littlefield, Catherine (1908-1951), ballet dancer and choreographer, born Philadelphia, Pa.; première danseuse Philadelphia Grand Opera Co. 1926-33; founded Littlefield Ballet 1935; created several ballets on American themes: 'Barn Dance' and 'Terminal'; restaged 'The Fairy Doll' and 'Daphnis and Chloe': D-141
 Little fox mite (*Mit̃ra vulpecula*), mollusk shell, *color picture* S-140
 Little Giant, nickname of Stephen A. Douglas D-125
 'Little Jack Horner', nursery rhyme, origin M-406
 Little John, a member of Robin Hood's band of outlaws R-164
 Little Knownwa River, in West Virginia. *See in Index* Kanawha
 Little Khingun Mountains, Manchuria. *See in Index* Khingan
 Little league, in baseball B-70, *picture* B-70
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 'Little Lord Fauntleroy', story by Mrs. Frances Hodgson Burnett of the seven-year-old Little Lord Fauntleroy. His curls and velvet suits set a fashion for small boys.
 Little Magician, nickname of Martin Van Buren V-436
 Little Miami River, in Ohio, tributary of Ohio River; 140 mi. long: *maps* O-348, 357
 Little millet, cereal M-255
 'Little Minister, The', novel by Sir James Barrie; Babbie, daughter of a village squire, in the guise of a gypsy, wins the love of Gavin Dishart, the little minister; background of Scottish village life.
 Little Missouri River, tributary of the Missouri, rising in Wyoming and flowing 450 mi. through Montana and North and South Dakota, *maps* N-282, U-252
 Little Mountain State, popular name for West Virginia.
 Littleneck. *See in Index* Hard clam
 Little Pee Dee River, tributary of Pee Dee in e. South Carolina, *map* S-291
 Little Red Riding Hood. *See in Index* Red Riding Hood
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 Little River Turnpike, historical road in U. S. R-161
 Little Rock, Ark., state capital, on Arkansas River; pop. 102,213: L-277, A-369, *maps* A-366, U-253
 Capitol, State, *picture* A-369
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 Little Russ'n. *See in Index* Ukraine
 Little St. Bernard Pass, Alpine pass (7180 ft.) in Italy s. of Mont Blanc; connects valleys of Dora Baltea and Isère.
 Little Sally Winters, game P-320
 Little Sisters of the Poor, founded in France 1840, extended to U. S. 1868; for relief and nursing of the aged and infirm poor
 vows M-358
 Little Steel formula, system of U. S. wage increases in smaller steel plants to cover 15 per cent rise in living costs between Jan. 1, 1941, and May 1, 1942; adopted by War Labor Board July 1942 to stabilize wages in World War II.
 Little theaters, theaters in which groups, chiefly amateurs, produce experimental dramas T-116

Key: cápe, át, fār, fást, whát, fáll; mē, yāt, fērn, thēre; ice, bīt; rōw, wón, fōr, nót, dō; cūre, būt, rýdo, fýll, būrn; out;

- Littleton, Sir Thomas** (1422-81), English judge and writer on law; 'Treatise on Tenures', dealing with English land laws of his day, is still used as an authority.
- Little Trianon, or Petit Trianon**, palace at Versailles, France V-463
- 'Little White Bird'**, a novel by Sir James Barrie B-60
- 'Little Women'**, novel by Louisa M. Alcott A-146, 147
- Littoral nation**, one with shore lines L-190
- Littoria, Italy.** See in *Index Latina*
- Liturgical music** M-459, 460
- Gregorian chants** M-459
- Liturgy** (from Latin *liturgia*, meaning "a public service"), term applied to any or all of the services used in public worship; especially in Roman Catholic, Greek Catholic, and Episcopal churches.
- Litvinov (lĭt-vĕ'nŏf)**, Maxim Maximovich (1876-1951), Russian statesman; diplomatic agent in England after Bolshevik revolution; commissar for foreign affairs 1930-39; ambassador to the U. S. 1941-43; deputy commissar for foreign affairs March-Aug. 1946.
- Lukin Islands**, between Formosa and Kyushu. See in *Index Ryukyu*
- Live-forever**, houseleek, or hen-and-chickens, perennial plants of the family *Crassulacae*; thick, succulent leaves, often in rosettes close to the ground; white, green, rose, or yellow star-shaped flowers.
- Live oak**, an evergreen oak O-319, 320
- Liver**, in human body L-277, D-91b, color pictures P-241-2, diagram D-91
- blood and** L-277, diagram B-209
- Liver fluke** W-302, pictures A-250a, W-302
- Liverleaf, or hepatica**, a plant of the crowfoot family, with liver-shaped leaves H-341, color picture F-170
- Livemore, Mary Ashton Rice** (1820-1905), reformer, early advocate of abolition of slavery, prohibition, and woman's suffrage, born Boston, Mass.; won reputation in Civil War as worker for Sanitary Commission.
- Liverpool, England**, seaport of Great Britain; on estuary of Mersey River; pop. 789,532: L-277-8, map, inset B-324, picture L-278
- cathedral** C-139
- Queensway Road Tunnel** (Mersey Tunnel) T-209, L-278
- world's greatest wheat market** W-117
- Liverpool, Nova Scotia**, Canada, industrial town 75 mi. s.w. of Halifax; pop. 3535; fishing, shipbuilding; paper and pulp mills: N-307, map C-73
- Liverpool, University of**, at Liverpool, England L-277-8
- Liverpool and Manchester Railway**, England, early railroad L-291, R-59
- George Stephenson** S-391
- Liverpool Mountains**, range in e. New South Wales, Australia; highest point 4500 ft.
- Liverwort** L-278-9, P-289, pictures L-278, color picture P-289
- confused with mosses** M-405
- Livesay, Dorothy** (Mrs. Duncan Macnair) (born 1909), Canadian poet ('Day and Night').
- Livestock, Reference-Outline** A-72. See also in *Index* Breeding, animal; Dairying; Domestic animals; Forage crops; Meat pack ng
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- United States: Truman's administrations** T-198, 200b, U-392
- UAW contract adjusts wages to** L-75
- Livingston, Edward** (1764-1836), lawyer and statesman, born Clermont, N. Y.; brother of Robert R. Livingston; served as congressman, U. S. senator, secretary of state under President Jackson, and minister to France 1833-35
- compiles Louisiana Code** L-333
- Livingston, Philip** (1716-78), signer of Declaration of Independence, born Albany, N. Y.
- signature reproduced** D-37
- Livingston, Robert R.** (1746-1813), statesman, born New York City; brother of Edward Livingston; first chancellor New York State 1777-1801; minister to France 1801-5
- aids Fulton** F-315
- Declaration of Independence** D-33, picture R-120
- defends Constitution** U-344
- Louisiana Purchase** L-335
- Statuary Hall.** See in *Index* Statuary Hall (New York), table
- Livingston, William** (1723-90), lawyer, born Albany, N. Y.; attacked English Parliament's interference in provincial matters and Anglican domination of King's College; representative from New Jersey to 1st and 2d Continental Congress; signed United States Constitution; governor of New Jersey 1776-90.
- Livingston, Mont.**, city on Yellowstone River, 45 mi. n. of Yellowstone Park, in farm region; pop. 7683; railroad machine shops; hunting and fishing resort: maps M-374, U-252
- Livingstone, David** (1813-73), Scottish missionary explorer of Africa L-280-1, A-49, picture L-280
- books by and about** L-281
- Stanley's search for** S-368-9
- Livingstone College**, at Salisbury, N. C.; African Methodist Episcopal Zion; opened 1885; arts and sciences.
- Livingstone Mountains**, range in Tanganyika Territory bordering n.e. shores of Lake Nyasa; highest point 9600 ft.
- Liv'us Andronicus (ān-drŏ-nĕ'kūs)** (284?-204? B.C.), first known Roman poet L-130
- Livonia**, district in s. Estonia and n. Latvia; a former Baltic province of imperial Russia with capital at Riga; 17,574 sq. mi.: L-135
- Livonia, Mich.**, city 18 mi. n.w. of Detroit; pop. 17,534; farm area; automobile parts; horse racing; Madonna College: map M-227
- Livorno (lĕ-vŏr'nŏ)**, also Leg'horn,
- Italy, Tuscan port, on w. coast; pop. 140,367; Leghorn straw hats; leather, glass, metal products; shipbuilding; anchovies: maps I-262, E-416, 425
- bought by Florence** (1421) F-147
- Livre (lĕv'rĕ)**, an old French silver coin worth about 19.3 cents, replaced by franc in 1795; originally equaled English pound in value (from *libra*, Latin for "pound").
- Livy (liv'i)**, anglicized name of Titus Livius (59 B.C.-A.D. 17), Roman historian, great prose writer; 35 of the 142 books of his history of Rome still exist: L-131
- Livyerer**, in Labrador, Canada L-76
- Lizard**, scaly-bodied, four-legged reptile L-281-4, R-110, pictures L-281-4
- foot**, pictures F-225
- fossil**, picture G-52
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- kinds** L-281-4, pictures L-281-4
- chameleon** C-183-4, pictures C-184
- dragon**, or giant L-284, picture L-282; discovery E-456
- flying dragon** L-284, D-126, picture L-283
- horned toad**, picture P-421
- iguana** I-25, picture I-25
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- salamander mistaken for** S-25
- Lizard, The, or Lizard Head**, a bold promontory of Cornwall; the most southerly point of Great Britain: map B-321
- Ljubljana (lyŭ'blyā-nā)**, German Laibach (lĕ'bāk), Yugoslavia, Slovenian city 50 mi. n. of Fiume; pop. 138,211; old castle and cathedral; Congress of Laibach 1821, at which emperors of Austria and Russia were present, restated basic principles of Holy Alliance: maps B-23, E-416, 425
- Ljusne (yŭs-nĕ')** River, also Ljusnan (yŭs-nān') River, Sweden, flows 220 mi. s.e. into Gulf of Bothnia, maps N-301, E-424
- Llama (lā'mā)**, South American animal of camel family L-285, C-63, pictures S-275, L-285, A-245, P-142a, P-163, Z-355
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- ruminant** R-254
- Llaneros (lyā-nā'rŏs)**, cattlemen of Venezuela V-441
- Llano Estacado (lān'ŏ ēs-tā-kā'dŏ)**, or Staked Plain, arid plateau in n.w. Texas and s.e. New Mexico; over 40,000 sq. mi.: T-81-2, N-170, maps T-90, N-179, U-278
- Llanos (lā'nŏs)**, Spanish lyā'nŏs), plains
- South America** S-270, maps G-169, S-255; Colombia C-387; Venezuela V-440-1, G-168b, S-275
- Texas plains** C-148
- Llanquihue (yān-kĕ'wā)**, Lake, in s. Chile; 240 sq. mi.; extends north of Puerto Montt which is its outlet to the Pacific: picture S-248
- Llaretta**, a plant. See in *Index* Yareta
- Llewellyn (lŏ-ĕl'lin)**, Richard, pen name of Richard David Vivian Llewellyn Lloyd (born 1907?), Welsh writer ('How Green Was My Valley', story of Welsh coal mining in Victorian age; 'None But the Lonely Heart', novel in cockney dialect of London slums).
- Lloyd, Harold Clayton** (born 1894), motion-picture actor, born Burchard, Neb.; began as "extra" at 19; famous for comedy roles in which he wore horn-rimmed glasses; formed own company 1923 ('Safety Last'; 'The Freshman'): picture M-433
- Lloyd Barrage**, also called Sukkur Barrage, in the Indus River at

- Sukkur in the province of Sind, Pakistan; a dam 4620 ft. long, completed in 1932; irrigates 5,300,000 acres: I-128, I-252
- Lloyd George, David, earl of Dwyfor (1863-1945), British statesman L-285-6, picture L-285
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- Loanda, Angola. See in *Index* Luanda
- Loango (lō-āng'gō), port of Middle Congo territory, French Equatorial Africa, 100 mi. n. of mouth of Congo; pop. 7300: map A-47
- Loan shark, laws for protection against B-52
- Lobachev'ski, Nikolai Ivanovich (1793-1856), Russian mathematician, born Makariev, Nizhni Novgorod; helped to found non-Euclidean geometry ('New Principles of Geometry').
- Lobbying, practice of influencing legislators and other public officials; word taken from *lobby*, part of assembly hall where private persons are permitted to interview legislators; may be influence for public good or for promoting private or corporate interests to public detriment; under Regulation of Lobbying Act (1946) lobbyists must register and give report of source and disbursement of their finances: C-436
- California law C-44
- Lobe, of lungs L-351, color pictures P-240-1, diagram L-351
- Lobe'lla, a genus of herbs of the family *Campanulaceae* with alternate leaves and white, blue, or red flowers; corolla very irregular; includes *Lobelia inflata* (Indian tobacco) used in medicine; *L. cardinalis*, cardinal flower
- when and how to plant G-13-14, table G-16
- Lobengula (lō-bēng-gū'la) (1833-94), king of the Matabele in Southern Rhodesia
- revolt R-144, R-144b
- Lobito (lō-bē'ty), Angola, one of best seaports in all w. coast of Africa; terminus of Benguela railway; pop. 23,897: map A-47
- Loblolly pine P-258, 259
- Lob Nor, in Sinkiang. See in *Index* Lop Nor
- Lobotomy, prefrontal, a brain operation B-283
- Lobster L-286-8, pictures L-286-7, N-59
- spiny lobster, or sea crawfish, related to L-288
- Lobster pot L-287, picture L-287
- Lobworm, a marine annelid (*Arenicola marina*) about 8 inches long, with bright red gills on its central segments; burrows in sandy shores between tide marks; used for bait; also called lugworm and lugbait.
- Local anesthetics A-246-7, B-147
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- Locarno, Switzerland, town at n. end of Lake Maggiore; pop. 7747; Madonna del Sasso sanctuary; Treaties of Locarno signed here: map S-475
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- Loch (lōk), Scottish word for lake. See in *Index* names of lakes, as Lomond, Loch
- Lochinvar (lōk-in-vār'), in Sir Walter Scott's 'Marmion', hero of ballad 'Lochinvar', "so faithful in love, and so dauntless in war."
- Lochy, Loch, w. Scotland, map B-324
- Locke, Alain Le Roy (1886-1954), American Negro author and historian L-288
- Locke, David Ross. See in *Index* Nasby, Petroleum V.
- Locke, John (1632-1704), English philosopher and political economist L-288-9, picture L-288
- child education, ideas on L-270, E-245
- draws Carolina constitution S-284
- ideas embodied in Declaration of Independence D-33, L-288
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- theory of mind E-245, L-288
- Locke, William John (1863-1930), English novelist and playwright, born Georgetown, British Guiana; first interest in architecture, secretary of Royal Institute of British Architects 1897-1907; a whimsical romanticist ('The Morals of Marcus Ordeyne'; 'The Beloved Vagabond'; 'Stella Maris'; 'Septimus').
- Locker plants, refrigerated C-381, F-223, R-96, picture F-222
- Lockhart, John Gibson (1794-1854), Scottish lawyer and writer (biographies of Burns, Napoleon, Scott); son-in-law of Sir Walter Scott.
- Lock Haven, Pa., residential and manufacturing city, 73 mi. n.w. of Harrisburg; pop. 11,381; paper and textile mills, chemicals, furniture and metal product factories; State Teachers College: map P-133
- Lockjaw, or tetanus A-268
- puncture wounds and F-97
- Lockport, N. Y., city on New York Barge Canal, named for two large locks situated there; pop. 25,133; grain and fruit; flour, textiles, veneers, auto radiators, paper, steel products: map N-204, picture N-208
- Locks, canal C-108
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- Panama Canal P-58, 62-3, pictures P-57, 59, 60, 61
- Rideau Canal, Canada, picture O-428
- Sault Sainte Marie Canal S-49, pictures S-50, C-108a
- Welland Ship Canal W-90
- Locks and keys L-289, pictures L-289
- time lock, in a bank, picture B-49
- Lock stitch, sewing machine S-117
- Lockwood, Belva Ann Bennett (1830-1917), lawyer, born Royalton, N.Y.; first woman permitted to practice before U. S. Supreme Court; active in woman suffrage movements; nominated for president of U.S. 1884 and 1888 by Equal Rights party.
- Lockyer, Sir (Joseph) Norman (1836-1920), English astronomer and physicist; pioneer in application of spectroscopy to sun and stars; explained sunspots; between 1870 and 1905 conducted eight British expeditions for observing total solar eclipses ('The Sun's Place in Nature'; 'Recent and Coming Eclipses'; 'The Chemistry of the Sun'; 'Inorganic Evolution')
- discovered helium in sun S-332
- Loeo-foco, obsolete popular name for friction matches; also applied to a New York City faction of Democratic party, because a meeting at Tammany Hall (1835) was held by the light of candles and matches after a rival faction had turned off the lights.
- Locomotive L-290-3, pictures L-290-3
- diesel-electric D-89-90, R-64, L-290-1, pictures L-290-1, U-266
- electric R-63-4, L-291, pictures L-291-2, R-61
- mine locomotive L-291, picture E-236
- towing locomotive, Panama Canal, picture P-60
- pneumatic P-329
- steam L-290, pictures L-292-3
- Baldwin Works, Philadelphia P-190
- Civil War, picture C-337
- development R-58-9, R-62-3, L-291, pictures R-60-1, L-292-3; Stephenson's inventions S-390, 391
- how it works, diagrams S-387-9
- reversing mechanism, diagrams S-389
- speed L-290
- types R-62-3
- Locoweed W-84, C-147, color picture F-180
- can become poisonous P-338
- Loeris, name for two separate districts of ancient Greece: East Loeris, on e. coast opposite Euboea; West Loeris, on Gulf of Corinth, s. of Doris: map G-197
- Lo'eust, an insect G-167-8b, L-294
- eggs G-168
- foot, picture F-225
- metamorphosis G-168a, picture G-168
- migration G-168, 168a
- principal parts, diagram I-152
- "seventeen-year," a cicada C-306-7, pictures C-306
- Locust, a rough-barked tree of the bean family L-294, picture L-294
- black locust seedlings prevent erosion, pictures U-317
- called false acacia A-4
- leaf, pictures L-152, L-294
- weight of black locust wood H-355
- Locust, honey. See in *Index* Honey locust
- Lod, Israel. See in *Index* Lydda

Key: cape, ät, für, fäst, what, fäll; mē, yēt, fērn, there; ice, bit; rōw, wōn, fōr, nōt, dē; cūrc, būt, ryde, fūll, bārñ; out;

Lode, of minerals M-268, 270, G-132
Lodestone. See in *Index* Magnetite
Lodge, Henry Cabot (1850-1924), political leader and historian, born Boston, Mass.; grandfather of Henry C. Lodge, Jr.; U. S. senator from Massachusetts 1893-1924; led Republican party in blocking U. S. entrance into League of Nations ('The Story of the Revolution'; 'Life of Alexander Hamilton'; 'Life of George Washington'; 'The Senate and the League of Nations')
 Alaska boundary dispute R-222
Lodge, Henry Cabot, Jr. (born 1902), political leader, born Nahant, Mass.; grandson of Henry Cabot Lodge; U.S. senator (Republican) from Massachusetts 1937-53 (resigned 1944 to serve in World War II, re-elected 1946); directed campaign which won Republican presidential nomination for Dwight D. Eisenhower 1952; appointed chief U.S. delegate to the United Nations Nov. 1952; picture E-287d
Lodge, Sir Oliver Joseph (1851-1940), English physicist, exponent of psychic research, and author; did valuable foundation work in electricity and radio; principal of University of Birmingham 1900-1919; in addition to autobiography and many scientific works, wrote 'Raymond, or Life and Death', and other books setting forth his belief in possibility of communication with the dead.
Lodge, Thomas (1558?-1625), English poet, dramatist, and writer of romances; his pastoral romance 'Rosalynde' gave plot to Shakespeare for 'As You Like It'.
Lodgepole pine, slender evergreen tree (*Pinus contorta*) of pine family. Grows 30 ft. to 80 ft.; thin bark peels off in scales. Leaves in twos, 2½ in. long; cones oval. Sometimes called jack pine, spruce pine, blackjack, knotty pine, tamarack, scrub pine, and yellow pine; table W-186b
Lodi (lō'dī), Calif., city 32 mi. s. of Sacramento; pop. 13,798; wines and brandies; canned foods; grape and wine festival in September; maps U-252, inset C-35
Lodi (lō'dē), Italy, town 18 mi. s.e. of Milan; pop. 23,305; French victory over Austrians (1796)
 Napoleon at N-8
Lodi (lō'dī), N. J., borough on Saddle River 3 mi. n.e. of Passaic; pop. 15,392; silk dyeing and finishing; map, inset N-164
Lodz (lōdz), Poland, city 75 mi. s.w. of Warsaw; pop. 622,495; enormous recent growth due to large textile industry; scene of battle of Lodz (1914); P-343, maps E-416, 424
Loeb (lōb), Jacques (1859-1924), German-American biologist; fertilized sea-urchin eggs chemically ("artificial parthenogenesis"); developed theory that many so-called "intelligent" actions of animals are physical or chemical in nature ("tropism").
Loeffer (lē'flēr), Charles Martin (1861-1935), American composer and violinist, born Mulhouse, Alsace; with Boston Symphony Orchestra 1883-1903; wrote songs, orchestral and chamber music; impressionistic style ('The Death of Tintagiles'; 'La Bonne Chanson'; 'A Pagan Poem'; 'Canticle of the Sun').
Loening (lō'nīng), Grover (born 1888), American aeronautical engineer, born Bremen, Germany; invented first flying boat; designed Loening monoplane and seaplane.

Loess (lō'ēs or lūs), a type of soil S-227, picture S-228
China C-259, 260, picture C-258
origin M-266, R-169
wind erosion D-154
Loewe (lō'vū), Johann Karl Gottfried (1796-1869), German composer, born near Halle, Germany; cantor and teacher in Stettin; one of first to give artistic form to ballad.
Loewy, Raymond Fernand (born 1893), American industrial designer, born Paris, France; came to U. S. 1919; designed streamline trains, ships, and automobiles, also buildings for New York World's Fair; author 'The Locomotive—Its Esthetics'
 modern automobile design, picture A-400i
Lofland, John (1798-1849), physician and author D-58
Lofoten Islands, also **Lofoden Islands**, group of rocky islands off n.w. coast of Norway; 1560 sq. mi.; N-304b, map N-301
Loft, in golf G-138, picture G-138
Lofting, Hugh (1886-1947), writer and illustrator, born Maidenhead, Berkshire, England; resident of U. S.; creator of character "Doctor Dolittle" and author of whimsical poetry and stories for young children; awarded Newbery medal 1923 for 'Voyages of Doctor Dolittle' ('Story of Doctor Dolittle'; 'Porridge Poetry').
Log, oil-well record P-172
Log, ship's, device for measuring speed; term also used for ship's record book: L-294-5, pictures L-295
Logan, George (1753-1821), statesman, born Stenton, Pa. (now a part of Philadelphia); U.S. senator from Pennsylvania 1801-7; his attempt to settle difficulties between France and United States (1798) without authority from the government led Congress to pass Logan Act, forbidding such activities by nonaccredited persons.
Logan, James (1674-1751), American colonial political leader, born Ireland; a Quaker and secretary to William Penn; chief justice Pennsylvania Supreme Court 1721-39; P-139
Logan, John (1725-80), English name of Cayuga Indian chief Tahgahjute; friend of the whites until the massacre of his family by the whites 1774; joined English and became a leader in Lord Dunmore's War.
Logan, John Alexander (1826-86), Civil War general and U. S. senator, born Jackson County, Ill.; admitted to bar 1851; distinguished service in Civil War; except for 2-year interval was member of U. S. Senate 1871-86; candidate for presidential nomination on Republican ticket 1884; author 'The Great Conspiracy' dealing with Civil War
 Illinois statesman I-42
 originates Memorial Day F-56
Logan, Joshua (born 1908), theatrical director, born Texarkana, Tex.; co-director as well as director of play 'Mister Roberts' and of musical play 'South Pacific'. See also in *Index* Heggen, Thomas O., and Michener, James A.
Logan, Rayford W(hittingham) (born 1897), Negro educator, born Washington, D.C.; professor of history, Howard University, Washington, D.C., 1938-; head of department 1942-; editor of 'What the Negro Wants'; author of 'The Negro and the Post-War World, a Primer' and 'The Negro in American Life and Thought'.

Logan, Stephen Trigg (1800-1880), jurist, born in Franklin County, Ky.; judge of circuit court; delegate to national convention at Chicago, Ill., in 1860
 Lincoln's law partner L-247
Logan, Utah, city 67 mi. n. of Salt Lake City; pop. 16,832; dairy products, canned goods, textile products, farm implements, lumber products; Utah State Agricultural College; maps U-416, U-252
Logan, Mount, 2d highest peak (19,850 ft.) of North America, in s.w. Yukon Territory; maps C-68, 80
 height, comparative. See in *Index* Mountains, table
Loganberry L-295
Logania (lō-gā'nī-a) family, or **Loganiaceae** (lō-gā-nī-ā'sē-ē), a family of plants, native chiefly to warm regions, including Carolina yellow jessamine, buddleia, pinkroot, ignatius bean, strychnine, natal orange, and summer lilac.
Logansport, Ind., industrial and railroad center 70 mi. n. of Indianapolis on Wabash and El rivers; pop. 21,031; trade in lumber and agricultural products; state institution for insane; map I-78
Logarithmic chart G-164-6, chart G-165
Logarithms L-295-6. See also table on following page
 hydrogen ion concentration expressed by H-460
 slide rule S-199
Logbook L-295
Log cabin S-144c, picture P-262
 building P-262, picture A-197
 interior, picture U-374
Log-cabin campaign, of William Henry Harrison H-278
Log-cabin fire, or crisscross fire C-61, 62
Loggerhead shrike, or butcherbird S-168, color picture B-185
Loggerhead turtle (genus *Caretta*) T-224
Loggia dei Lanzi (lōd-gā dā'e lünt'sē), gallery in Florence I-279-80
Logging. See in *Index* Lumbering
Logic L-296, P-203
 trivium, medieval education A-340
 writings of Aristotle A-340
Logistics (lō-gīs'tiks), in military science, details of moving, quartering, and supplying troops
 modern warfare W-10
 United States Army A-383
Logogram, in writing W-310
Logrolling. See in *Index* Birling
Logrolling, in politics I-83, A-391
Logroño (lō-grō'n-yō), Spain, ancient walled city in n., capital of province of same name; on River Ebro; pop. 51,975, with suburbs; wine trade; map E-425
Logwood L-296
Lohengrin (lō'hēn-ġrīn), in German legend L-296
 opera by Wagner, story O-390-1
Loin, cut of beef, picture M-156b
Loire (lwār) River, longest river in France (629 mi.) L-296-7, maps F-259, E-419, 425
Loki (lō'kē), in Norse mythology, mischief-making god
 Apples of Iduna and S-56
 Balder and B-20
 in 'Nibelungenlied' N-232
Lolland (lō'ldn), also **Landan**, Danish island in Baltic Sea; 479 sq. mi.; pop. 87,150; maps D-71, E-424
Lol'ards, name applied to followers of John Wycliffe in 14th century; originally a Dutch word meaning "mumbler" or "mutterer"
 Wycliffe W-314
Lolos (lō'lōs), warlike, primitive peo-

TABLE OF COMMON LOGARITHMS

N	0	1	2	3	4	5	6	7	8	9	D	N	0	1	2	3	4	5	6	7	8	9	D
1.0	0000	0043	0086	0128	0170	0212	0253	0294	0334	0374	42	5.5	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	8
1.1	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755	38	5.6	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	8
1.2	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106	35	5.7	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	8
1.3	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430	32	5.8	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	7
1.4	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732	30	5.9	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	7
1.5	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014	28	6.0	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846	7
1.6	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279	26	6.1	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917	7
1.7	2304	2330	2355	2380	2405	2430	2455	2480	2504	2529	25	6.2	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	7
1.8	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765	24	6.3	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	7
1.9	2788	2810	2833	2856	2878	2900	2923	2945	2967	2989	22	6.4	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122	7
2.0	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	21	6.5	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189	7
2.1	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	20	6.6	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	7
2.2	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	19	6.7	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	6
2.3	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784	18	6.8	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	6
2.4	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	18	6.9	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445	6
2.5	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	17	7.0	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506	6
2.6	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	16	7.1	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	6
2.7	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	16	7.2	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627	6
2.8	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	15	7.3	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686	6
2.9	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	15	7.4	8692	8698	8704	8710	8716	8722	8727	8733	8739	8745	6
3.0	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	14	7.5	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802	6
3.1	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	14	7.6	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859	6
3.2	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	13	7.7	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915	6
3.3	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	13	7.8	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971	6
3.4	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	13	7.9	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025	5
3.5	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	12	8.0	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079	5
3.6	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	12	8.1	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133	5
3.7	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	12	8.2	9138	9143	9149	9154	9159	9165	9170	9175	9180	9186	5
3.8	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	11	8.3	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238	5
3.9	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	11	8.4	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289	5
4.0	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117	11	8.5	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340	5
4.1	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	10	8.6	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390	5
4.2	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	10	8.7	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440	5
4.3	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	10	8.8	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489	5
4.4	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	10	8.9	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538	5
4.5	6532	6542	6551	6561	6571	6580	6590	6599	6609	6618	10	9.0	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586	5
4.6	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	9	9.1	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633	5
4.7	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	9	9.2	9638	9643	9647	9652	9657	9661	9666	9671	9675	9680	5
4.8	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	9	9.3	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727	5
4.9	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	9	9.4	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773	5
5.0	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	9	9.5	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818	5
5.1	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	8	9.6	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863	5
5.2	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235	8	9.7	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908	4
5.3	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	8	9.8	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952	4
5.4	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	8	9.9	9956	9961	9965	9969	9974	9978	9983	9987	9991	9996	4

Those unfamiliar with logarithms should read the general principles, especially about the mantissa and characteristic, in the article on Logarithms before using this table.

Finding logarithms of numbers. Locate the first two figures in the left-hand column and the third at the top. The corresponding four numbers in the table are the mantissa (mantissa of 1.51 is 1790). The characteristic is one less than the number of digits left of the decimal point. Thus the logarithm of 1.51 (usually written $\log 1.51$) = 0.1790; $\log 15.1$ = 1.1790; $\log 151$ = 2.1790; and so on.

For decimal fractions, the characteristic is one greater than the number of zeros between the decimal point and the first significant digit, and has a negative sign above the characteristic, with the mantissa in the table ($\log 0.151$ = $\bar{1}.1790$; $\log 0.0151$ = $\bar{2}.1790$; and so on).

With a number having four significant digits proceed by interpolation as follows: obtain the difference between the mantissas for the next smaller and next larger three-digit numbers; multiply this by the last digit of your number, divide by 10, and add the result to the logarithm for the first three digits of the number. Thus, to find $\log 15.13$. $\log 15.2$ (=1.1818) - $\log 15.1$ (=1.1790) = .0028. $\frac{3}{10} \times .0028$ = .00084. Adding: 1.1790 + .00084 = 1.17984 (= $\log 15.13$ approx.). The column marked D at the right gives the average value for the difference between any two mantissas

on the line, and may be used (remembering to multiply, then divide by 10 as above) if less accurate results will suffice.

To find a number from its logarithm. Locate in the table the mantissa next below the one you have, write the three corresponding digits from the side and top, and point off decimally as the characteristic requires. For remaining digits, reverse the interpolation process given above. Thus, to find the number for the logarithm 1.17984. The next lowest mantissa is .1790, and the number (pointed off for characteristic 1) is 15.1. The difference between mantissas .1790 and .1818 is .0028. Divide by the difference you have: $\frac{0.0028}{0.00084}$ = 3.3. Adding this after 15.1 (not to it) gives 15.133, the approximate answer.

Computing with logarithms. When all characteristics are positive, the computations proceed as explained in the article on Logarithms. When negative characteristics appear treat the characteristics and mantissas separately, and at the end combine any characteristic resulting from the mantissas with the others. Thus, to find 151×0.151 . To $\log 151$ (=2.1790) add $\log 0.151$ (= $\bar{1}.1790$). Result: 1.3580 (= \log of 22.8 approx.). To divide 0.151 by 151: from $\log 0.151$ (= $\bar{1}.1790$) subtract $\log 151$ (=2.1790). Result 3.000 (= \log of .001). To find the 7th power of 0.151: multiply $\log 0.151$ (= $\bar{1}.1790$) by 7. Answer: $7 \times \bar{1}.1790 = \bar{7} + 1.2550 = 6.2550$ (= \log of 0.00000179 approx.).

- ple of borderland hills of s.w. China; live under feudal system.
- Lomax** (*lō'māks*), John Avery (1867-1948) (born Goodman, Miss.), and his son, Alan (born 1915, Austin, Tex.), ballad collectors ('American Ballads and Folk Songs'; 'Cowboy Songs and Other Frontier Ballads'; 'Negro Folk Songs')
'Folk Song, U.S.A.' S-417
- Lombard College**, at Galesburg, Ill.; founded 1851; merged with Knox College 1930.
- Lombard League**, of cities of n. Italy against Frederick I F-281
- Lombardo**, Guy (Albert) (born 1902), orchestra leader, horn London, Ontario, Canada; orchestra (Royal Canadians) noted for "sweet" music.
- Lombardo Toledano**, Vicente (born 1894), Mexican labor leader; professor of law and philosophy National University 1918-33: M-203, 204
- Lombards**, also **Långobards** ("long beards"), Germanic tribe which settled in n. Italy L-297
Charlemagne conquers L-297, C-187
Gregory I and G-214
- Lombard Street**, London, England L-297
- Lombardy**, a region of n. Italy; area 9190 sq. mi.; pop. 6,560,721; cap. Milan: L-297, I-265-6, map I-263
history I-273
Po River P-330
- Lombardy**, Iron crown of M-247
Charlemagne crowned with L-297
Napoleon crowned with N-9
- Lombardy poplar** P-370
- Lombok**, island of Indonesia, e. of Bali; about 1810 sq. mi.; pop. 701,290; rice, coffee, indigo, sugar: maps E-202, A-407
- Lombroso** (*lōm-brō'sō*), Cesare (1836-1909), Italian, founded criminal anthropology; originated theory that there is a "criminal type" marked by physical signs ('The Criminal').
- Lomond**, Ben, Scotland. *See in Index* Ben Lomond
- Lomond, Loch**, largest lake in Scotland, in counties of Stirling and Dumbarton; 27 sq. mi.; length 23 mi.: maps B-321, inset B-324
- Lomonosov** (*lōm-ō-nō'sōf*), Mikhail (1711-65), Russian poet and philologist; set up principle of latter-day Russian language ('Ode on the Capture of Khotin'): R-294
- Lonchocarpus**, plant, source of rotenone I-164
- London**, Jack (John Griffith London) (1876-1916). American novelist L-297, A-230b, picture L-297
- London**, England, largest city in the world; capital of Great Britain; pop. Greater London 8,346,137: L-298-307, maps E-416, A-531, L-300-1, inset B-325, pictures L-298-9, 302-6
art galleries and museums L-305-6.
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St. Paul's Cathedral L-298, 301, A-319, map L-301, picture L-302: bell B-121; choir stalls, picture W-190a
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water system in early times W-74
West End L-305
Westminster Abbey W-98-9, picture W-98
Whitehall, district L-303-4, map L-301, picture L-303
zoo Z-359
- London**, Ontario, Canada, city of w. Ontario, on Thames River; pop. 95,343: L-307, maps C-69, 72
library, children's room, picture L-201
- London**, Declaration of. *See in Index* Declaration of London
- London**, Treaty of (1913). *See in Index* Treaties, table
- London**, Treaty of (1915) W-223. *See also in Index* Treaties, table
- London**, Treaty of (1930) P-14, N-93
conference, picture H-423
- London**, Treaty of (1936) P-102. *See also in Index* Treaties, table
- London**, University of, educational institution at London, England; grew out of University College, founded 1827; by royal charter of 1836 had been examining body only. for conferring degrees; reorganized 1900 to include also teaching, research, and extension work: L-306, U-404
- London Bridge**, historic bridge over the Thames River, London, England; original, completed in early 13th century, bore rows of houses with chapel in center; present bridge, completed 1831, of granite, is 65 ft. wide with 5 arches of varying sizes: map L-301
Shakespeare's time, picture S-123
London Bridge Is Falling Down, game, picture G-8a
- London Company**, also known as Virginia Company of London, organized 1606 by King James I of England to establish colonies in North America between 34th and 41st degree of n. latitude; dissolved 1624. London Company was the s. branch of a joint land stock company of which Virginia Company of Plymouth was n. branch. *See also in Index* Plymouth Company
- grant to Pilgrims M-145
Hakluyt promotes H-246
Jamestown J-293, V-489, A-193
London Conference on Naval Armament
1930 N-93, P-14, picture H-423
1936 P-102, P-14
London County Council L-299
Londonderry, 2d marquis of. *See in Index* Castlereagh
Lon'donderry, also Derry, Northern Ireland, port on Foyle River about 65 mi. n.w. of Belfast; pop. 50,099; linen; besieged by James II in 1689; county borough and chief town of Londonderry County (land area 804 sq. mi., pop. 155,520, both figures including county borough): maps B-324, I-227, picture I-232
London Missionary Society C-304
London Round Table Conferences on India I-68a
Lone Scouts B-273
Lone Star State (Texas) T-77
Long, Crawford Williamson (1815-78), American surgeon L-307, A-246
Statuary Hall. *See in Index* Statuary Hall (Georgia), table
Long, Hucy Pierce (1893-1935), political leader, born Winnfield, La.; governor of Louisiana 1928-31; U.S. senator 1931-35; nicknamed "the Kingfish"; shot to death by Dr. Carl A. Weiss, Jr.; statue of Long presented by Louisiana to National Statuary Hall 1941 (autobiography 'Every Man a King')
bridge at New Orleans named for N-183, picture B-307
Long, James (1793?-1822), American filibusterer; invaded Spanish Texas (1819-21) proclaimed short-lived Texas republic at Nacogdoches.
Long, John Davis (1838-1915), public official, born Buckfield, Me.; governor of Massachusetts 1880-83; member of Congress 1883-89; secretary of navy 1897-1902, during Spanish-American War.
Long, John Luther (1861-1927), novelist and dramatist, born Hanover, Pa. ('Madame Butterfly'; 'The Darling of the Gods').
Long, Stephen Harriman (1784-1864). U. S. Army surveyor and engineer, born Hopkinton, N. H.; led exploring expedition to Rocky Mts. 1819-20; discovered Long's Peak; authority on railroads: F-38
Long Beach, Calif., city on s. coast about 20 mi. s. of Los Angeles; pop. 250,767: L-307, maps U-252, inset C-35
harbor L-316
Long Beach, N. Y., city 21 mi. s.e. of New York City, on s. Long Island shore; pop. 15,586: map, inset N-204
Long Beach State College, at Long Beach, Calif.; state control; opened 1949; arts and sciences, business, education, industrial arts, physical education; graduate study.
Long-billed curlew S-209. *See also in Index* Curlew
Longbow A-303
Hundred Years' War H-445, 446, A-56, pictures H-337, H-445, 447
Influence on knighthood K-57
Influence on warfare W-9
Long Branch, N. J., resort on Atlantic coast 30 mi. s. of New York City; resident pop. 23,090: map N-164
Longchamps, or Longchamp (*lōn-shān'*), part of the Bois de Boulogne, w. of Paris, France; site of an abbey founded 1260 by Isabel, sister of St. Louis, and suppressed 1792; now a racecourse.
Longcloth, plain, lightweight, closely woven cotton fabric; soft finish.
Long-distance telephone T-44-5
Long division D-109
Long-eared owl O-430, 431

- Long-cared sunfish S-454
- Long-erons, of airplane A-96, *picture* A-97
- Longevity, length of life. *See in Index* Life, *subhead* length of; Vital statistics
- Longfellow, Henry Wadsworth (1807-82), American poet L-308-10, *picture* L-308
- books by and about L-310
- bust in Westminster Abbey, *picture* L-304
- Cambridge home C-50, L-309, 310, *picture* L-309
- 'Evangeline' A-6: scenes of story N-309, N-184
- Hall of Fame, *table* H-249
- 'Hiawatha' L-310: quotations from O-431, L-103, W-84; 'Kalevala' compared S-410
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- Portland, Me., associations M-55
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- 'Santa Filomena', poem N-237
- "Long glass," a telescope T-48
- Longhorn cattle C-141*a-b*, 142, *picture* C-148
- ranching C-147-8, C-150-2, *picture* C-148
- Long-horned beetles, beetles of the family *Cerambycidae*
- long-horned musk beetle, *picture* B-105
- Long house, type of dwelling used by certain primitive people
- Borneo B-254
- Iroquois Indians, *picture* I-89
- Longinus (*lōn-jī'nūs*), Cassius (213?-273), Greek critic G-212
- Long iron shot, in golf, *picture* G-137
- Long Island, N. Y., island s. of Connecticut forming s.e. portion of New York State; 1,401 sq. mi.; pop. 5,237,918: L-311, N-208, *maps* N-196, *inset* N-204, *picture* L-311
- Brooklyn B-329, *picture* B-329
- Jones Beach, *picture* L-311
- national rifle matches R-153*a*
- Long Island, battle of (1776) L-311, B-329
- Long Island Sound, arm of Atlantic Ocean between Long Island and mainland; 76 mi. long: *maps* N-196, *inset* N-204
- oyster fisheries O-439, *pictures* O-437
- Longitude, distance in degrees east or west on earth's surface L-311-13, L-132-5, E-176, 192, *diagrams* L-132-4, *pictures* L-312-13, *table* L-135. *See also in Index* Latitude
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- projection of A-437-8
- time and T-134-6, 137, L-312
- use in finding directions D-96-9
- Longitudinal arch, of the foot F-226
- "Long Knives" V-490
- Long Lake, N. Y., in Adirondacks; 14 mi. long, 1 mi. wide: *maps* N-196, 205
- Longleaf pine, Southern yellow pine, or Georgia pine P-258, 259, G-70
- Longman, (Mary) Evelyn Beatrice (Mrs. Nathaniel Horton Batchelder) (1874-1954), sculptor, born Winchester, Ohio; designed bronze doors for chapel of U. S. Naval Academy, Annapolis.
- Long measure, *table* W-87
- Long-neck clam. *See in Index* Soft-shell clam
- Long-nosed monkey, or proboscis monkey M-362, *picture* M-351
- Long Parliament C-190-1, E-366
- Cromwell dismisses, *picture* C-517
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- Rump Parliament C-191, C-517, E-366, *picture* C-517
- Long primer, size of type T-228
- Long Sault Rapids, in St. Lawrence River S-19
- Longshanks, nickname of Edward I of England E-264
- Longs Peak, Colo., one of highest peaks of Rocky Mts. (14,255 ft.), in Rocky Mountain National Park, 50 mi. n.w. of Denver C-402, *maps* C-408, U-296-7
- Longstreet, Augustus Baldwin (1790-1870), newspaper editor, educator, and Methodist minister, born Augusta, Ga.; president Emory College, University of Mississippi, and University of South Carolina ('Georgia Scenes').
- Longstreet, James (1821-1904), Confederate Civil War general; distinguished himself at Bull Run, Fredericksburg, Chickamauga, and in battles of the Wilderness; U. S. minister to Turkey 1880-81; U. S. Railway Commissioner 1898-1904: R-86
- Bull Run, second battle C-334
- Chickamauga battle C-336
- Gettysburg G-105-6
- Long-tailed kra monkey M-352
- Long-tailed shrew S-168
- Long ton W-87
- Longview, Tex., city 125 mi. e. of Dallas; pop. 24,502; oil production; plow, box, and canning factories pipeline, *maps* T-90, U-253, *picture* P-179
- Longview, Wash., city in s.w. at confluence of Cowlitz and Columbia rivers; pop. 20,339; lumber, paper, paint, creamery products: *maps* W-44, U-252
- bridge. *See in Index* Bridge, *table*
- Longwall method, in coal mining C-365, *picture* C-364
- Longwood College, at Farmville, Va.; state control; for women; founded 1839; arts and sciences, education.
- Longworth, Nicholas (1869-1931), political leader, born Cincinnati, Ohio; Ohio Republican congressman 1903-13, 1915-31; speaker of House 1925-31; married Alice Roosevelt 1906.
- Loncera (*lō-nīs'ēr-ə*), the honey-suckle genus of plants H-418
- Lono, Hawaiian god H-289
- Hawaiians receive Captain Cook as reincarnation of H-290
- Loofa, or luffa, sponge S-355
- 'Looking Backward', novel by Edward Bellamy A-230, N-311
- Lookout, Cape, North Carolina, 70 mi. s.w. of Cape Hatteras, *maps* N-268, 275, U-253
- Lookout Mountain, near Denver, Colo. Buffalo Bill's tomb B-342
- Lookout Mountain, ridge in n.w. Georgia extending into Tennessee and Alabama C-199, *map* T-67
- battle in Civil War C-199, *maps* C-199, C-334
- cable railway, *picture* C-198
- Loom
- development S-350-2: Cartwright C-130; Industrial Revolution I-131, 132
- hand loom
- American Colonies, *picture* C-356*d*
- Egyptian, ancient, *picture* T-103
- England, *picture* E-369*a*
- Guatemala, *pictures* G-222*a*, T-104
- Hopl, *picture* I-92
- Japan, *picture* J-318
- Navajo, *pictures* A-358, S-350
- practice, *pictures* S-351
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- rugs, *picture* T-217: oriental R-247, *picture* R-250
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- power loom C-496, *picture* T-100
- cotton, *picture* T-101
- first in America T-100
- Jacquard S-352, F-7: rugs, *picture* R-251; silk, *picture* S-185
- principle F-7
- wool, *picture* W-196
- Looming, a type of mirage M-294
- Loon, a diving water bird L-314, *picture* L-314
- Loop, in Chicago C-231, 232, *map* C-231*b*, *picture* C-230
- Loop (inside) and loop (outside). *See in Index* Aviation, *table* of terms
- Loop antenna, in radio R-39
- Looper, or cankerworm C-112
- Loos, Anita (born 1893), novelist, playwright, and motion-picture scenario writer, born Sisson, Calif. (novel, 'Gentlemen Prefer Blondes', later dramatized).
- Loos (*lōs*), small village in n. France, 1 mi. n.w. of Lens; scene of British offensive 1915; town captured but British lost about 70,000 men.
- Loosestrife, leafy-stemmed perennial herbs embracing the genus *Lysimachia* of the primrose family; common loosestrife is *L. vulgaris*, a tall coarse plant with large yellow flowers in terminal leafy panicles; *L. nummularia* (creeping Charlie, moneywort, or creeping jenny) is a trailing plant with large yellow flowers which are often used in rock gardens.
- Loosestrife family, or Lythraceae (*lith-rā'sē-ē*), a family of plants, shrubs, and trees, native chiefly to tropical America, including swamp loosestrife, loosestrife, henna, crape myrtle, cigar flower, purple loosestrife, and blue waxweed.
- Lop-eared rabbit R-18-19
- Lope de Vega. *See in Index* Vega
- Carpio
- López (*lō'pās*), Carlos Antonio (1790-1862), dictator of Paraguay P-76
- López, Francisco Solano (1826-70), dictator of Paraguay P-76
- López de Legaspi, Miguel (1524-72), Spanish soldier, conquered Philippines and founded Manila P-201
- López de Villalobos (*vēl-yā-lō'bōs*), Ruy (1500?-1544), Spanish navigator expedition to Philippines P-201
- Lop Nor (*lōp nōr*), or Lob Nor (*lōb nōr*), marshy, salty depression in Sinkiang (Chinese Turkestan); receives Tarim River: A-413, *maps* C-259, A-406
- Loquat (*lō'kwāt*), a small evergreen tree or shrub (*Eriobotrya japonica*) of the rose family and its fruit F-304
- Lorain', Ohio, port and industrial city on Lake Erie, 26 mi. w. of Cleveland; pop. 51,202; ships steel products, coal, lumber, iron ore, farm products; makes steel tubes and pipe, power shovels, ships, stoves; truck trailers manufactured nearby: *map* O-356
- Erie Avenue Bridge. *See in Index* Bridge, *table*
- Loran, in radar R-28
- iceberg location I-8
- Loras College, at Dubuque, Iowa; Roman Catholic; for men; founded 1839; arts and sciences.
- Loren (*lōr'kā*), ancient city in s.e. Spain on river Sangonera; pop. 24,127; trade center; many battles between Christians and Moors: *map* E-425
- Lord, a British title borne by bishops, marquises, earls, viscounts, and barons; also borne as courtesy title by eldest sons of dukes, marquises, and earls, and younger sons of dukes and marquises; title of office borne by lord chancellor.
- Lord Dunmore's War, expedition by American colonists against Indian coalition formed to check westward expansion of Virginia S-108
- Lord Howe Island, dependency of New South Wales, Australia, in Pacific

- about 435 mi. n.e. of Sydney; 5 sq. mi.; pop. 200: *maps* A-489, P-16
- Lord mayor**, title given to mayors of cities of York, Dublin, and London
- London L-301-2**
- Lord Mayor's Day**, England F-59
- Lords**, House of, upper house of British Parliament P-87, 88, 89
- appeal court, serves as C-501
- Cabinet members chosen from C-4
- Reform Bill crisis R-255
- veto power limited L-286
- Lord's Day S-1**
- Lord's Prayer**, The, prayer taught by Jesus to disciples (Matt. vi, 9-13) hornbook contains, *picture* E-241
- Lord's Supper**, or Holy Eucharist, in Christian church, a sacrament in which bread and wine are taken in commemoration of Christ's death. This sacrament was instituted by Christ at his supper (Lord's Supper, or Last Supper) with his disciples the night before his death (Matt. xxvi, 26-29; Mark xiv, 22-25; Luke xxii, 14-20).
- Lorelei** (*lô-rê-lî*), fabled Rhine siren; legend probably from an echoing rock of that name in the Rhine poem by Heine H-330
- Lorentz, Hendrik Antoon** (1853-1928), Dutch physicist; sought consistent theory for magnetism, electricity, and light; explained the Zeeman effect, and with Zeeman won the Nobel prize in physics for 1902 contraction of matter R-98, 99
- Lorenz** (*lô-rênts*), Adolf (1854-1946), Austrian orthopedic surgeon; devised bloodless operation (forcible manipulation) for congenital dislocation of hip joint; also operation for clubfoot.
- Lorenzetti** (*lô-rên-tsê'tî*), Ambrogio (active 1319-48), and Pietro (active 1305-48), two Sienese painters, brothers; noted chiefly for religious frescoes; Ambrogio was most gifted, and in vigorous, colorful, and naturalistic works showed influence of Giotto; he painted a series of allegories representing good and had government.
- Lorenzo, Saint**. See in *Index* Lawrence, Saint
- Lorenzo de' Medici** (*lô-rên'sô dô mî-dê-chê*) (1449-92), "the Magnificent," Florentine statesman and patron of arts M-163, F-148, *picture* M-163
- Leonardo da Vinci V-474**
- Michelangelo M-212, S-78c**
- Lorenzo de' Medici** (1492-1519), duke of Urbino, grandson of Lorenzo the Magnificent
- tomb adorned by Michelangelo, *picture* M-214
- Loretto Heights College**, at Loretto, Colo.; Roman Catholic; for women; founded 1890; arts and sciences.
- Lorgnette** (*lôrn-yê't*), eyeglass S-330
- Loricata** (*lôr-i-kâ'ta*), order of reptiles, also called Crocodilia, comprising the crocodiles, the alligators, and the gavials. Also suborder of edentates comprising the armadillos crocodiles C-515
- Lorient** (*lô-rê-ân*), France, fortified naval port in n.w. on Bay of Biscay at junction of Scorff and Blavet rivers; pop. 10,764; shipyards, arsenal, and fisheries: *map* E-425
- Lorimer, George Horace** (1868-1937), editor, born Louisville, Ky.; editor in chief of *Saturday Evening Post*, 1899-1936; popular books on success ('Letters from a Self-Made Merchant to His Son').
- Loring, Eugene**, real name LeRoy Kerpestein (born 1914), dancer and choreographer, born Milwaukee, Wis.; danced with Fokine's ballet, Ballet Caravan, Ballet Theatre; formed own company, Dance Players, in New York City, 1941; created ballets 'Yankee Clipper', 'Billy the Kid', 'The Great American Goof', and 'City Portrait'.
- Lorin's engine**. See in *Index* Athodyd
- Loris**, a species of short-tailed lemur.
- Lor'na Doone** (*dô-n*), novel by Richard Doddridge Blackmore which made the Exmoor country famous; the heroine is an heiress kidnapped by outlaws and reared by them.
- Lorne, marquiss of**. See in *Index* Argyll, duke of
- Lorne, Firth of**, inlet of Atlantic, w. coast of Scotland; terminus of Caledonian Canal: *maps* B-321, 324
- Lorrain, Claude**. See in *Index* Claude Lorrain
- Lorraine** (*lô-rân*'), district of n.e. France (also called Lotharingia and Lothringen) A-180-1, *map* E-425. See also in *Index* Alsace-Lorraine
- Charles the Bold invades C-195
- gains Belgian land B-115
- Lory**, also lorikeet, any of a large group of parrots, chief genera *Domicella*, *Lorius*, *Trichoglossus*, *Chalcopsitta*, and *Eos*; distinguished from other parrots by its brushlike tongue with which it extracts nectar from flowers; chiefly in Australia and New Guinea.
- Los Alamos, N. M.**, in Los Alamos County, 24 mi. n.w. of Santa Fe; pop. 9934: N-181, *maps* N-178, U-252
- Los Alamos Scientific Laboratory**, *table* A-470
- Los Angeles** (*lôs ân-gê-lês* or *lôs ân-g'ê-lês*), Calif., largest city on Pacific coast; pop. 1,970,358: L-314-17, *maps* U-252, *inset* C-35, *pictures* L-315
- community center, *picture* A-400h
- furniture market F-319a
- government L-317
- harbor L-316, 307, *pictures* L-315, C-48
- history L-317
- industries L-314, 316; ceramics P-399
- motion pictures M-412, 432, L-314
- museum L-316. See also in *Index*
- Museums, *table*
- playground movement P-86a
- rapid growth L-317, *charts* G-165
- temperature C-38
- University of Southern California, *picture* C-43
- water supply, aqueducts A-283, C-39, *pictures* A-283
- 'Los Angeles', German-built U. S. dirigible B-34, picture B-36**
- Lossing, Benson John** (1813-91), historical writer, editor, illustrator, born Beekman, N.Y.; his 'Pictorial Field-Book of the Revolution' a pioneer historical work.
- "Lost Battalion, The,"** 554 men in World War I from the 77th (New York) Division, who were not lost, but cut off during advance and surrounded by enemy Oct. 2-7, 1918, during battle of the Meuse-Argonne; under command of Major Charles W. Whittlesey, troops refused to surrender in spite of repeated enemy attacks, lack of food, extreme cold, and mistakenly placed barrage attack from own army; only 194 were rescued
- Meuse-Argonne battle M-185
- pigeon takes message P-254
- "Lost Colony of Virginia,"** English colony in what is now North Carolina which disappeared in 1591; the Croatan Indians in North Carolina claim to be descendants of an Indian tribe which these colonists joined; they intermarried with its members; thus an explanation is
- given for the mixed blood and occasional English names of the Croatans: N-278
- pageant by Paul Eliot Green P-19a
- "Lost Dauphin"** L-321, *pictures* L-321, F-292
- Lost Ten Tribes**, ten of twelve tribes of United Kingdom of Israel which seceded to form separate kingdom of Israel: B-9, J-352
- Lost-wax process**, in casting metals S-75
- Lot, Abraham's nephew A-4**
- Lota** (*lô'tâ*), Chile, mining town and seaport about 20 mi. s. of Concepción; pop. 31,087; coal mining and coal shipping: *map* C-250
- Lothair I** (795-855), Holy Roman emperor, grandson of Charlemagne; became joint ruler 817 when Louis I, his father, divided the empire among his sons; after years of strife with his brothers received Italy and imperial title together with lands along Rhine and Rhone rivers (Partition of Verdun, 843).
- Lothair II**, sometimes called Lothair III (1070?-1137), Holy Roman emperor 1133-37; created duke of Saxony 1106, and elected German king 1125; his reign was regarded as a golden age for Germany.
- Lothair II** (825-869), king of Lorraine, son of Lothair I; received as his kingdom district w. of Rhine between North Sea and Jura Mts., called after him Lotharingia or Lorraine (German *Lothringen*)
- jewelry, *picture* J-346
- Lotharingia, France**. See in *Index* Lorraine
- Lothario** (*lô-thâ'ri-ô*), in Nicholas Rowe's tragedy 'The Fair Penitent', handsome, perfidious libertine, the proverbial 'gallant, gay Lothario.'
- Lothian, Philip Henry Kerr**, 11th marquis of (1882-1940), British statesman; member of Liberal party; secretary to prime minister Lloyd George 1916-22; undersecretary of state for India 1921-32; ambassador to U.S. 1939-40; advocated closer Anglo-American co-operation in World War II.
- Lothringen, France**. See in *Index* Lorraine
- Loti** (*lô-tê*'), Pierre, pen name of Louis Marie Julien Viaud (*vê-yô*) (1850-1923), French naval officer and novelist; exquisite stylist; master of description; his colorful and romantic novels deal largely with people and experiences in foreign lands he visited ('The Marriage of Loti'; 'Madame Chrysanthème'; 'Disenchanted'; 'An Iceland Fisherman'): F-289
- Lottery**, gambling scheme in which a sum of money is paid for the chance of drawing a prize of greater value than the amount invested; now illegal in the United States.
- Lo'tus**, plant L-317, *picture* L-317
- Lotus eaters L-317**
- Odysseus' men O-342
- Lotze** (*lôt'sû*), Rudolf Hermann (1817-81), German philosopher; assumed that the orderly functioning of nature implied a motivating, ideal principle; helped to develop physiological psychology.
- Loubet** (*lô-bê*'), Emile (1838-1929), French statesman, 7th president of Third Republic 1899-1906; remitted Alfred Dreyfus' sentence.
- Loucks, Henry Langford** (1846-1928), American farmer and political leader, leader of agrarian movement; settled 1884 on homestead in Deuel County, Dakota Territory; founder of *Dakota Ruralist*; president National Farmers' Alliance

1892, leader of successful fight for initiative and referendum in South Dakota.
Loudness, of sound S-238
Loud-speaking apparatus, radio R-40
Lough (*lōk*), Irish name for lake; same as Scottish loch.
Louis, Saint. *See in Index* Louis IX
Louis I, Holy Roman emperor. *See in Index* Louis I, the Pious, king of France
Louis II (827-75), Holy Roman emperor (crowned 850) and king of Italy (came to throne 839), son of Lothair I; fought Saracens and restored order in Italy.
Louis III, the Blind (880?-928), Holy Roman emperor (crowned 901) and king of the Lombards (chosen 900), grandson of Louis II; his eyes were put out 905 by Berengar, rival king of the Lombards; thereafter lived in exile in Provence.
Louis IV, the Bavarian (about 1287-1347), Holy Roman emperor (crowned 1328) and king of Germany (elected 1314); despite his being almost constantly at war, first with his brother over Bavaria, then with the pope over Germany, Louis increased the boundaries of his domains and fostered trade.
Louis, kings of Bavaria. *See in Index* Ludwig
Louis, the German (804-76), king of the East Franks; 3d son of Louis the Pious and grandson of Charlemagne; his share of Charlemagne's empire after Partition of Verdun (843) formed nucleus of modern Germany.
Louis I, the Pious (778-840), king of France and Holy Roman emperor, youngest son of Charlemagne whom he succeeded: L-318, C-188
Louis VI, the Fat (1081-1137), king of France L-318
Louis VII (1120-80), king of France L-318
Iris adopted as emblem I-232
Second Crusade C-520
Louis VIII (1187-1226), king of France L-318
Louis IX (1214-70), "Saint Louis," king of France; canonized in 1297; festival August 25: L-318-19, *picture* L-318
 built Sainte Chapelle P-84
 Chartres Cathedral windows, *picture* G-125
 in Crusades C-522
Louis X (1289-1316), king of France, son of Philip IV; ruled 1314-16.
Louis XI (1423-83), king of France L-319, *picture* L-319
 Charles the Bold opposes C-195
 private postal system P-386
 silk industry started T-106
Louis XII (1462-1515), king of France L-319
Louis XIII (1601-43), king of France L-319
 Jardin des Plantes, founded B-261
 Richelieu R-151-2, *picture* R-152
Louis XIV (1638-1715), king of France L-319-20, *picture* L-320
 Cadillac in New France C-10
 Canal du Midi C-108a
 Colbert aids C-380-1
 court etiquette E-404
 dance promoted by D-144
 engraving of period E-387
 furniture of period I-179
 Gobelin tapestries T-14
 James II aided by J-293
 La Salle explores the Mississippi L-105
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 Marquise de Malintou M-67
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 Versailles palace V-463, *picture* V-463
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Louis XV (1710-74), king of France L-320
 builds Petit Trianon V-463
 furniture of period I-179, *picture* I-184
 Voltaire V-523
Louis XVI (1754-93), king of France L-320-1, F-292, 293
 burial place P-85
 calls Estates-General E-399, F-292
 furniture of period I-179
 Marie Antoinette M-95-6
 Mirabeau M-293
 popularized potato P-392
 Robespierre demands death R-163
Louis XVII (1785-95?), "the lost dauphin" L-321, *pictures* F-292, L-321
Louis XVIII (1755-1824), king of France L-321
 Talleyrand T-8
Louis I (1838-89), king of Portugal; came to throne 1861; abolished slavery in Portuguese colonies.
Louis II (1870-1949), prince of Monaco, succeeded to throne of principality of Monaco, 1922.
Louis, Joe (Joseph Louis Barrow) (born 1914), boxer, born Lexington, Ala.
 heavyweight champion B-272, *picture* B-271, *table* B-272
Louisbourg, Fortress of, on Cape Breton Island, Nova Scotia, Canada captured 1745 by American colonists K-46
 captured 1758 by British N-309: Wolfe at W-181
 national historic park N-39, C-118
Louise (1776-1810), queen of Frederick William III of Prussia, born at Hanover; her beauty and goodness and the fortitude with which she bore the hardships of the Napoleonic wars made her a popular heroine.
 'Louise', opera by Gustave Charpentier
 story O-391
Louise, Lake, Alberta, Canada, in Canadian Rocky Mountains
 Banff National Scenic and Recreational Park N-38f, *map* N-38f
Louisiade (*lō-ē-zē-ād'*) Archipelago, group of islands off s.e. coast of New Guinea, belonging to Territory of Papua: pop. 10,384: *maps* A-489, E-203, P-16
Louisiana (*lō-ē-zē-ān'ā*), a gulf state of the U. S.; 48,523 sq. mi.; pop. 2,683,516; cap. Baton Rouge: L-322-34, *maps* L-330-1, 333, 327, U-253, 274, *pictures* L-323-4, 333
 agriculture L-322-4, 326
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 Capitol, State B-79, *picture* L-333
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 New Orleans N-182-5, *pictures* N-182-4
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 geographic region in which situated, *maps* U-250, 274: The South U-272-83
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 La Salle claims A-191
 French colony: Cadillac governs C-10
 New Orleans founded N-185
 purchased by United States L-334-5
 battle of New Orleans J-286, W-14, *picture* J-287
 Civil War C-433, F-37, L-334, *map* C-334
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 lumber and timber L-324, 326: cy-press C-534; mahogany, *picture* N-184
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 muskrat raising F-326
 name, origin of, and nickname L-325
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 natural resources L-322, 324, 325
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 parks, monuments, and other areas L-326-7, *maps* L-327, N-18: Chalmette N. H. P. N-32
 places of interest L-326-7, N-184, *map* L-327
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 rivers L-322, 325: Mississippi M-307-10
 seal L-325
 song, state L-325
 trade, wholesale and retail L-326
 transportation L-322, 333, 325
 waterways L-333, N-182, 183
 Louisiana College, at Pineville, La.; Baptist; founded 1906; arts and sciences.
 Louisiana heron H-351
 Louisiana parakeet P-93
 Louisiana Polytechnic Institute, at Ruston, La.; state control; founded 1894; arts and sciences, agriculture and forestry, business administration and economics, education, engineering, home economics.
 Louisiana Purchase L-334-5, A-235-6, *map* U-379
 effect on New Spain S-308b, N-185
 Lewis and Clark explore L-176-7, *map* U-378
 Louisiana Purchase Exposition, at St. Louis, Mo., from April 30 to Dec. 1, 1904; recorded admissions were 19,694,855; amusements on the "Pike"; 500 buildings; floral clock with 50-ft. hands
 Forest Park site of S-22
 Louisiana State University and Agricultural and Mechanical College, at Baton Rouge, La.; state control; opened 1860; arts and sciences, agriculture, chemistry and physics, commerce, education, engineering, law, library, medicine, music, social welfare; graduate school: *picture* L-324
 Louis Napoleon N-11-12. *See also in Index* Napoleon III
 Louis Philippe (*lō-ē' fē-lēp'*) (1773-1850), "citizen-king" of France L-321

Paris, Improvements P-85
 Louls style, name of various period furniture I-179-80, picture I-184, table I-178
 Louisville, Ky., largest city of state on Ohio River; pop. 369,129; L-335-6, maps K-30, U-253, pictures K-34, L-335
 dam D-7
 Louisville, University of, at Louisville, Ky.; founded 1798; arts and sciences, adult education, business, dentistry, law, medicine, music, nursing, science, social work; graduate school: L-336
 Louisville and Portland Canal L-335, map C-108, picture L-335
 Lounsbury, Thomas Raynesford (1838-1915), scholar, born Ovid, N. Y.; professor English language and literature, Sheffield Scientific School of Yale University, for more than 30 years; distinguished for his studies in development of English language ('History of the English Language'; 'Studies in Chaucer'; 'The Text of Shakespeare').
 Lourdes (*lôrd*), France, city 82 mi. s.w. of Toulouse; pop. 12,421: L-336, map E-425, picture L-336
 Lourenço Marques (*lô-rên'sô mâr'-kês*), capital of Mozambique (Portuguese East Africa); pop. 93,303: M-442, map A-47
 Louse, a wingless blood-sucking insect of the order *Siphunculata* (also called *Anoplura*); eggs are called nits; name also applied to other insects
 bird, or biting P-78, color picture I-154b
 body, or sucking P-77-8, picture P-79, color picture I-154b
 crab, picture P-79
 DDT control, picture D-103
 disease carrier D-102
 egg (head louse), picture E-269
 plant A-272-3. See also in Index
 Aphids
 Louse fly, name for flies of family *Hippoboscidae* that spend adult lives like lice as parasites on birds and mammals; young born one at a time in advanced larval state; some adults wingless, notably the sheep tick (*Melophagus ovinus*); others winged (*Lynchia americana*, which infests owls); still others lose wings during parasitic life (*Lipoptena depressa*, which preys on deer): F-189
 Louvain (*lô-vân*), Flemish Leuven, city in central Belgium; pop. 36,640 L-337, picture L-337
 Louvain, University of, at Louvain, Belgium, founded 1425; leading scientific institution of medieval Europe, having 6000 students in 16th century; famous department of Roman Catholic theology; active in Counter Reformation; suppressed during French Revolution, but re-established 1817
 library L-337
 L'Ouverture, Toussaint. See in Index
 Toussaint L'Ouverture
 Louvois (*lô-vô*), François Michel Le Tellier, marquis de (1641-91), French statesman, Louis XIV's great war minister and evil genius, who wasted prosperity of France and destroyed peace of Europe for military "glory."
 Louvre (*lô-vr*), art museum in Paris, France E-439, P-83b, map P-83a. See also in Index Museums, table art treasures, pictures E-443
 Cimabue's 'Madonna of the Angels' P-24-5, color picture P-25
 Da Vinci's 'Mona Lisa' P-27, V-474, picture E-443, color picture P-26b
 'Diana', picture E-445

Frans Hals's 'The Gypsy Girl' P-29, color picture P-29
 Goujon's 'Fountain of the Nymphs', picture S-79
 Holbein's 'Anne of Cleves' P-27b, color picture P-27b
 Holbein's 'The Astronomer', picture H-406
 Michelangelo's 'Bound Slave', picture S-78b
 Prud'hon's portrait of the Empress Josephine, picture J-364
 Room of Psyche, picture E-441
 'Scribe of the Old Kingdom', picture E-285
 Sumerian sculpture, pictures S-75, B-5
 Victory of Samothrace, picture S-77
 Louÿs (*lû*), Pierre (1870-1925), French poet and novelist; founded at 19 a review *La Conquête*; famous for novel 'Aphrodite', which was produced as an opera; also wrote 'Astarte', 'Psyche', 'Les Chansons de Bilitis', 'Les Aventures du Roi Pausole', and other sensuously beautiful books.
 Love
 child development C-248, 245b, 240d
 motivating force E-340
 Love, goddess of (Aphrodite, or Venus) A-273
 Love, god of (Cupid, or Eros) C-529-30
 Lovebird P-93, color picture P-92
 Love-in-a-mist, a flower. See in Index
 Nigella
 Lovejoy, Elijah Parish (1802-37), abolitionist, born Albion, Me.; editor of an antislavery paper which was published in Alton, Ill.; killed by mob: C-331
 Lovelace, Francis (1618?-75?), English governor of colonial New York 1668-73; fostered trade but became extremely unpopular for his high taxes.
 Lovelace, Mand Hart (born 1892), author, born Mankato, Minn.; known for Betsy-Tacy series of books for girls, based on happy memories of her own girlhood, also for 'The Tune Is in the Tree', 'The Trees Kneel at Christmas', and 'Early Candlelight'.
 Lovelace, Richard (1618-58), English Cavalier poet, immortalized by two lyrics ('To Lucrecia, on Going to the Wars'; 'To Althea from Prison').
 Lovelace, in Samuel Richardson's 'Clarissa', the hero-villain, a wealthy young libertine.
 Love-les-bleeding, a hardy annual garden herb (*Amaranthus caudatus*) with pretty drooping clusters of dark purplish flowers; native to the tropics.
 Lovely fir. See in Index Silver fir
 Loveman, Robert (1864-1923), poet, born Cleveland, Ohio; lived great deal of life in South; wrote simple poems of nature ('Songs from a Georgia Garden'; 'On the Way to Willowdale').
 'Love of Three Kings, The', opera by Italo Montemezzi
 final scene, picture O-393
 Mary Garden as Flora, picture O-391
 story O-389
 Lover, Samuel (1797-1868), Irish novelist and poet; tendency to caricature makes his pictures of Irish life not entirely truthful. 'Handy Andy', a roaring farce dealing with an Irish servant lad's drollery; 'Rory O'More', equally popular as novel and play.
 'Love's Labour Lost', comedy by Shakespeare, written about 1591, in which princess of France and her three ladies cause King Ferdinand of Navarre and his three friends to break vows
 chronology and rank S-129

Lovett, Robert Abercromble (born 1895), banker and public official, born Huntsville, Tex.; special assistant to secretary of war 1940-41; assistant secretary of war for air 1941-45; undersecretary of state 1947-49; assistant secretary of defense 1950-51; secretary of defense 1951-53.
 Lovett, Robert Morss (born 1870), educator and writer, born Boston, Mass.; professor of English, University of Chicago 1909-36; government secretary of Virgin Islands 1939-43 ('A History of English Literature', with W. V. Moody; 'Richard Gresham' and 'A Winged Victory', novels; 'Cowards', play).
 Low, David (born 1891), British cartoonist, born Dunedin, New Zealand; created Colonel Blimp as a symbol of stupidity; political cartoonist *London Evening Standard* 1927-52, *Manchester Guardian* after Feb. 1, 1953 ('A Cartoon History of Our Times').
 Low, Juliette Gordon (1860-1927), founder of Girl Scout movement in the U. S. L-337, picture L-337
 Girl Scouts G-113
 Low, Seth (1850-1916), merchant, educator, and administrator, born Brooklyn, N. Y.; mayor of Brooklyn 1882-86 (enforced first municipal civil-service rules adopted in America); president Columbia University 1890-1901; mayor of Greater New York 1901-3.
 Low, Will Hickok (1853-1932), decorative painter, designer of stained glass, and illustrator, born Albany, N. Y. (Illustrations for Keats' 'Lamia'; frieze in legislative library, New York State Capitol).
 Low, in weather forecasting W-80
 Low Archipelago, in S. Pacific. See in Index Tuamotu
 Low Church, popular term for that party in the Anglican and Episcopal church which stresses evangelical views.
 Low Countries, name applied to a region in Europe comprising Belgium, Luxemburg, and the Netherlands.
 Lowden, Frank O'Brien (1861-1943), lawyer and political leader, born Sunrise City, Minn.; from poor farm boy became successful lawyer, notable congressman; governor of Illinois 1917-21; actively engaged in farming and in promotion of co-operative marketing.
 Lowe, Sir Hudson (1769-1844), English general, fought throughout Napoleonic wars, conspicuous in campaigns of 1813 and 1814; custodian of Napoleon on St. Helena.
 Lowell, Abbott Lawrence (1856-1943), educator and political scientist, born Boston, Mass.; brother of Amy and Percival Lowell; president of Harvard University 1909-33; restricted elective system; developed social life among students through freshman dormitories ('The Government of England'; 'Governments and Parties in Continental Europe'; 'Conflicts of Principle').
 Lowell, Amy (1874-1925), American poet and critic L-337
 Lowell, Francis Cabot (1775-1817), Boston merchant, founder of U. S. cotton manufacturing industry, born Newburyport, Mass., son of John Lowell: T-100-1
 Lowell, Mass., named for L-338
 Lowell, James Russell (1819-91), American poet, essayist, and critic L-337-8, A-226c, picture L-338
 abolitionist writings C-331
 'Biglow Papers' L-338

Cambridge home C-50, picture A-318
estimate of Holmes H-407
Hall of Fame, table H-249
quoted A-226d, f

Lowell, John (1743-1802), American jurist, born Newburyport, Mass.; said to have been author of clause in Massachusetts state constitution declaring "all men are born free and equal"; this clause was interpreted in 1783 by the Supreme Court of state to mean that slavery was abolished; father of Francis Cabot Lowell and grandfather of James Russell Lowell.

Lowell, Percival (1855-1916), astronomer, born Boston, Mass.; brother of Amy and Abbott L. Lowell; established Lowell Observatory 1894; discovery of planet Pluto in 1930 direct result of his mathematical prediction ("The Genesis of Planets").

Lowell, Robert (Traill Spence, Jr.) (born 1917), poet, born Boston, Mass.; great-grandnephew of James Russell Lowell; married to novelist Jean Stafford 1940-48 (divorced); convert to Roman Catholicism; Guggenheim fellowship 1947-48; awarded Pulitzer prize 1947 for "Lord Weary's Castle".

Lowell, Mass., one of greatest textile manufacturing centers of United States; pop. 97,249; L-338, maps M-133, U-253

Lowell Observatory, at Flagstaff, Ariz. A-344
Pluto discovered P-285

Lower Austria, a province in n.e. Austria; area 7,478 sq. mi.; pop. 1,250,494; cap. Vienna; A-494

Lower California, Mexico. *See in Index* California, Lower

Lower Canada, name formerly given to province of Quebec Q-8, C-96, O-387

Lower-case letters T-229, A-179

Lower Egypt, that part of Egypt north of 30° N. latitude E-272

Lower House (House of Representatives) C-435

Lower Saxony, German Niedersachsen (*nē'dēr-zūk-sēn*), state in British zone, Germany; 18,231 sq. mi.; pop. 6,797,379; cap. Hanover; map G-88

Lower Silesia, former province of Germany. *See in Index* Silesia

Loves, John Livingston (1867-1945), educator and author, born Decatur, Ind.; professor of English literature Harvard University 1918-39; noted for critical works on Chaucer, Shakespeare, Coleridge ("The Road to Xanadu"; "Art of Geoffrey Chaucer"; "Essays in Appreciation").

Lowestoft (*lōw'tōft*), England, seaport and summer resort of Suffolk, 110 mi. n.e. of London; pop. 42,837; important fisheries; captured by Cromwell 1643; Dutch fleet defeated by Duke of York 1665; map B-325
porcelain P-398

Low German, dialect G-82

Lowlands, of central Scotland S-63, map S-63

Lowland white fir. *See in Index* Giant fir

Low latitudes C-350

Lowmsbery, Eloise (born 1888), writer, born Pawpaw, Ill.; brings medieval history to life in her books for boys and girls; "Boy Knight of Relms", picture of France in the days of Joan of Arc; "Out of the Flame", court life of Francis I; "Marta the Doll".

Low relief, or bas-relief (*bā-rē-lēf'* or *bā'rē-lēf*), in sculpture S-74

Low wave, table R-30

Low wing plane. *See in Index* Aviation, table of terms

Loxodrome (*lōk'sō-drōm*), or rhumb line, in navigation N-75

Loyalist, or Tory, in American Colonies R-125, P-358, picture R-124 after Revolution R-130, C-96

Loyalists, United Empire. *See in Index* United Empire Loyalists

Loyal Legion, Military Order of the, patriotic society founded 1865 at Philadelphia, Pa., on the day following Lincoln's assassination; organized by U.S. Army and Navy officers; membership limited to such officers and their direct male descendants; purposes: fellowship among and welfare of U.S. soldiers and sailors, care of widows and orphans of deceased members.

Loyal Order of Moose. *See in Index* Moose, Loyal Order of

Loyalty, to one's country. *See in Index* Patriotism

Loyalty Islands, French *Iles Loyauté*, Pacific group 60 mi. e. of New Caledonia, of which it is a dependency; 800 sq. mi.; pop. 11,100; copra, rubber; map P-16

Loyola (*loi-ō'lā*), Ignatius de, Saint (1491-1556), founder of Jesuit Order; festival July 31; L-338-9, picture R-92
converts Francis Xavier X-327
Counter Reformation L-339, R-93

Loyola College, at Baltimore, Md.; Roman Catholic; for men; founded 1852; arts and sciences, business; evening sessions coeducational.

Loyola University, at Chicago, Ill.; Roman Catholic; founded 1870; arts and sciences, commerce, dentistry, institute of social and industrial relations, law, medicine, nursing, social work; graduate school.

Loyola University, at New Orleans, La.; Roman Catholic; for men; coeducational in professional departments; established 1911; arts and sciences, business administration, dentistry, law, music, pharmacy; graduate studies.

Loyola University of Los Angeles, at Los Angeles, Calif.; Roman Catholic; for men; established 1929; arts and sciences, business, engineering, law.

Loyson (*lōw-zōh'*), Charles (1827-1912), French preacher, called "Père Hyacinthe"; eloquent speaker but his unorthodox beliefs caused his excommunication from Roman Catholic church.

Lozeau (*lō-zō*), Albert (1878-1924), Canadian poet and journalist, born Montreal; an invalid from youth; ranks high for sensitiveness and imagination; C-106

Lozier, Jean Baptiste Charles Bouvet de. *See in Index* Bouvet de Lozier, Jean Baptiste Charles

LP-Gas (liquefied petroleum gas) G-33, P-173

Luanda (*ly-ān'dā*), or *Loanda* (*lō-ān'dā*), also São Paulo de Loanda (*sou' pou'ly thē hoān'dā*), seaport, capital of Angola; pop. 141,722; former center of slave trade; map A-47

Luan (*ly-ā'y*), Hawaiian feast H-288b, picture H-289

Lubang Islands, group on s.w. coast of Luzon, P. I.; chief island Lubang (66 sq. mi.) commands entrance to Manila Bay; map P-195

Luba's, town of Luzon, P. I.; in rice and sugar district; pop. 36,574.

Lubber's knot, or granny knot K-60

Lubber's line, in navigation C-429

Lubbock, Sir John. *See in Index* Avebury, John Lubbock, Baron

Lubbock, Percy (born 1879), English writer; style influenced by Marcel

Proust and Henry James; best known for "Earlham", a book of reminiscences; edited the letters of Henry James.

Lubbock, Tex., city about 110 mi. s. of Amarillo; pop. 71,747; cotton and cotton products, packed meats, grain feeds; Texas Technological College; Mackenzie State Park; maps T-90, U-252

Lübeck (*li'bēk*), Germany, seaport on Trave River, 12 mi. from Baltic Sea; pop. 238,276; manufactures: maps G-88, E-416, 424
head of Hanseatic League H-260

Lubin, David (1849-1919), agricultural organizer, born Kłodowa, Russian Poland; brought to U. S. in 1855; founded dry-goods and mail-order business in California, 1874; devoted last part of his life to agricultural problems. *See also in Index* Agriculture, International Institute of

Lubitsch (*ly'bich*), Ernst (1892-1947), motion-picture director and producer, born Berlin, Germany; to U.S. 1922; brilliant style and sophisticated humor ("Lady Windermere's Fan"; "Merry Widow"; "Ninotchka").

Lublin (*ly-blēn'*), Poland, city 95 mi. s.e. of Warsaw; pop. 111,025; flourished in 12th century; scene of Russian victory over Austrians in World War I; maps P-344, E-417, 424

Lublin, Treaty of (1569). *See in Index* Treaties, table

Lubricant, oily or greasy substance used to diminish friction L-339
castor oil C-135
graphite G-156
petroleum L-339, charts P-175-7

Luca della Robbia. *See in Index* Robbia

Lu'can (Marcus Annaeus Lucanus) (A.D. 39-65), Roman poet, author of "Pharsalia", epic on civil war between Caesar and Pompey.

Luca'nia, ancient name applied to Basilicata (*bā-zē-lē-kā'tū*), a region in s. Italy; cap. Potenza; area 3856 sq. mi.; pop. 628,197; I-268, map I-263

Lucas, Edward Verrall (1868-1938), English essayist, novelist, and biographer; "the modern Charles Lamb"; widely popular for his genial humor and broad sympathies ("The Open Road", anthology; "The Life of Charles Lamb"; "Over Bremerton's" and "London Lavender", novels; "Pleasure Trove", essays; "A Wanderer in London" and "A Wanderer in Paris", travel).

Lucas, Eliza. *See in Index* Pinckney, Elizabeth (or Eliza) Lucas

Lucas, Frederic Augustus (1852-1929), scientist, born Plymouth, Mass.; director American Museum Natural History, New York City, 1911-23 ("Animals of the Past"; "Animals before Man in America").

Lucas, John Seymour (1849-1923), English historical and portrait painter painting, picture W-138

Lucas Van Leyden (*li'dēn*) (1494?-1533), Dutch painter and engraver, superb technician; influenced by Albrecht Dürer, later by Marcantonio.

Lucea (*lyk'kā*), old and picturesque city in n. Italy, 12 ml. n.e. of Pisa; pop. 32,896; many antiquities; large trade; map E-425

Luce, Clare Boothe (Mrs. H. R. Luce) (born 1903), writer, born New York City; edited *Vogue* 1930, *Vanity Fair* 1931-34, then turned to

Key: cāpe, āt, fār, fāst, whāt, fāll; mē, yēt, fērn, thēre; īce, bīt; rōw, wōn, fōr, nōt, dā; cāre, būt, rjāde, fūll, būrn; out;

- writing plays ('The Women'; 'Kiss the Boys Goodbye'); later became a war correspondent ('Europe in the Spring'); member U. S. Congress 1942-46; became U. S. ambassador to Italy March 1953.
- Luce, Henry Robinson** (born 1898), editor and publisher; born China, son of American missionary; husband of Clare Boothe Luce; cofounder and editor in chief of *Time*, Inc., publishers of *Time*, *Life*, *Fortune*, *Architectural Forum*, and *Sports Illustrated* magazines.
- Lucerne** (*lū-sēr'n*), German Luzern (*lū-sēr'n*), Switzerland, capital of canton of Lucerne at n.w. end of Lake Lucerne; pop. 60,526; favorite tourist resort: *maps* S-475, E-425, *picture* S-478.
- Lion of Lucerne** T-123, *picture* T-123
- Lucerne**. See in *Index* Alfalfa
- Lucerne, Lake of**, also Luzern (Vierwaldstättersee), beautiful mountain-rimmed lake in central Switzerland; 24 mi. long: *map* S-475
- Lucia, Santa**. See in *Index* Lucy, Saint
- 'Lucia di Lammermoor'** (*lū-chē'ä dē lām-mēr-mōr*), opera by Gaetano Donizetti story O-391
- Lucian** (*lū'shūn*) (120?-180?), Greek satirist and humorist G-212, S-309
- Lucifer** (*lū'si-fēr*), name of Venus as morning star; applied by Isaiah to king of Babylon ("How art thou fallen from heaven, O Lucifer, son of the morning!"), and, through misunderstanding of this passage by later writers, to Satan.
- Luciferase**, an enzyme manufactured in the cells of certain animals, the function of which is to control that slow process of oxidation known as bioluminescence or luminescence: P-208
- Luciferin**, a chemical substance occurring in luminescent animals, which, when acted upon by the enzyme luciferase, produces light: P-208
- Lucifer** F-92
- Lucilius, Gaius** (180?-103 B.C.), Roman satirist L-130
- Lucin railroad cutoff** G-185, *picture* U-419
- Lucite**, a synthetic plastic P-310, 313
- Luckhardt, Arno Benedict** (born 1885), physiologist, born Chicago Ill.; professor of physiology, University of Chicago from 1923 (chairman of department 1941-46, professor emeritus from 1946); with J. Bailey Carter discovered value of ethylcne gas as an anesthetic.
- Luckner, Felix von, Count** (born 1881), German naval officer and adventurer, born Dresden, Germany; became sailor at age of 13; gained title of "Sea Devil" by daring exploits in World War I; lived in U.S. for several years; returned to German naval service 1940 (hero of "The Sea Devil", by Lowell Thomas).
- Lucknow, India**, manufacturing and rail center in Uttar Pradesh state; pop. 496,861: L-339, *maps* I-54, A-407
- sliege** (1857) L-339. See also in *Index* Siege, *table*
- 'Lucky Hans'**, a German folk tale, retold by the Grimm brothers.
- Lucretia** (*lū-kre'shī-ā*), Roman matron whose suicide because of outrage inflicted by Sextus, son of King Tarquin the Proud, provoked expulsion of the Tarquins.
- Lucretia Borgia** (1480-1519), duchess of Ferrara B-253
- Lucretius** (*lū-kre'shī-ūs*) (Titus Lucretius Carus) (96?-55 B.C.), Roman poet-philosopher L-131
- Lucullus** (*lū-kū'lūs*), Lucius Licinius (110?-56? B.C.), immensely wealthy Roman noble, helped conquer Mithridates; "Lucullan luxury" has become proverbial.
- Lucy, Saint, Italian Santa Lucia** (*sūn'tā lū-chē'ā*) (283?-304?), noblewoman of Syracuse, Sicily; two attempts at torturing her having failed, she was finally killed by sword; festival December 13.
- Lucy, Sir Thomas** (1532-1600), English squire, justice of peace, said to have prosecuted Shakespeare S-119
- Lud'dites**, bands of workmen organized in England to smash machinery 1812-18 in protest against displacement of hand labor.
- Lu'dendorff, Erich von** (1865-1937), German general, born Prussia; expert strategist; worked with Hindenburg in World War I and with him responsible for many successful campaigns; fled to Sweden after Germany's defeat; returned to Munich 1919; supported Hitler for a time; later became a mystic; author of several books about World War I
- aids Hitler H-385
- Liège** W-220
- offensive of 1918 W-228
- Lüderitz** (*lū'dū-rīts*), seaport in South West Africa on Lüderitz Bay; founded by German merchant, Adolf Lüderitz, in 1883; pop. 3451; diamond mines; railroad terminus: *map* A-47
- Lud'ington, Mich.**, commercial city and resort on Lake Michigan and Marquette River 75 mi. n.w. of Grand Rapids; pop. 9506; salt, watchcases and jewelry, game boards, furniture, house and kitchen utensils; airport: *map* M-227
- car ferries M-230
- Lud'low, England**, old town in s. Shropshire; pop. 6455: *map* B-325
- castle, *picture* E-351
- Ludlow, a linotype machine** L-259
- Ludovico il Moro** (*lū-dō-vē'kō ēl mō'rō*) (1479-1500), duke of Milan, patron of Leonardo da Vinci V-474
- Ludwig** (*lū'tvīk*) I (1786-1868), king of Bavaria, grandfather of Ludwig II; munificent patron of art; forced to abdicate by revolution in 1848
- beautifies Munich M-450
- Ludwig II** (1845-86), king of Bavaria, grandson of Ludwig I and cousin of Ludwig III; patron of Richard Wagner; died insane
- Neuschwanstein Castle, *picture* G-95
- Ludwig III** (1845-1921), king of Bavaria; cousin of Ludwig II; succeeded 1913, abdicated 1918.
- Ludwig, Emil** (1881-1948), American author, born Breslau, Germany; lived early life in Switzerland; became U. S. citizen 1941; in his youth wrote plays, sketches, and novels but found greatest success in his "humanized" historical biographies, including those of Napoleon, Bismarck, Goethe, Lincoln; 'Gifts of Life', autobiography.
- Ludwig, Otto** (1813-65), German dramatist and novelist, one of leading German writers of fiction in middle 19th century ('The Hereditary Forester', prose tragedy; 'Between Heaven and Earth', novel; 'The Maccabees', poetic tragedy).
- Ludwigshafen** (*lū'tvīks-hū-fēn*), Germany, city on Rhine opposite Mannheim; pop. 123,869; large chemical works and other manufactures; known for large trade in coal, timber, iron: *maps* G-88, E-425
- Lufbery, Raoul** (1884-1918), American aviator, World War I ace; credited with 17 victories; killed in combat.
- Luff**. See in *Index* Nautical terms, *table*
- Luffing**, in sailing B-217
- Lufkin, Tex.**, city 115 mi. n.e. of Houston; pop. 15,135; paper mill; livestock, dairying; lumber; foundries; business college; Angelina and Davy Crockett National Forests nearby: *map* T-90
- Luftwaffe** (*lūft'vā-fū*), German air force, including antiaircraft units. Word means "air weapon."
- Lugano** (*lū-gū'nō*), Lake of, deep narrow lake enclosed by mountains, partly in Switzerland, partly in n. Italy, between Lakes Maggiore and Como; 20 mi. long: *map* S-475
- Lugbait, or lugworm**. See in *Index* Lobworm
- Lugh** (*lu*) the Long-Handed, Irish sun-god I-234
- Lug pole**, camp cooking device C-62
- Luhan** (*lū'hān*), Mabel Dodge (born 1879), heiress and writer, born Buffalo, N.Y.; 4-vol. autobiography, 'Intimate Memories', tells of her association with artists and authors in New York, in Europe, and at her Taos, N. M., estate ('Winter in Taos'; 'Taos and Its Artists').
- Luinneach, Ireland**. See in *Index* Limerick
- Luini** (*lū-ē'nē*), Bernardino (1475?-1532?), Italian artist; most noted as a fresco painter; excelled at depicting sacred and mythological subjects.
- Lujenda River**, Mozambique, Africa, *map* E-199
- Luke, Saint** one of apostolic assistants, traditional author of the Third Gospel and of the Acts; festival October 18: A-275
- Luke, Gospel of Saint, Third Gospel** and 3d book of New Testament A-275
- Lukeman, (Henry) Augustus** (1871-1935), sculptor, born Richmond, Va.; successor to Guizon Borglum in charge of Confederate memorial, Stone Mountain, Ga.; portrait busts, statues, monuments (portrait statues of William McKinley and Jefferson Davis; equestrian statue of Kit Carson; 'Manu the Law Giver of India').
- Luks, George Benjamin** (1867-1933), painter, born Williamsport, Pa.; war correspondent and illustrator in Spanish-American War. His paintings of poorer classes, street scenes, portraits, and his interpretations of childhood show free, virile, and spontaneous technique ('The Spielers'; 'Old Clothes Man').
- Lulea** (*lū-lē-ō*), Sweden, seaport on Gulf of Bothnia; pop. 22,514; shipbuilding; lumber, iron: *maps* N-301, E-424
- Lule** (*lū'lē*) River, in n. Sweden; flows 200 mi. to Gulf of Bothnia: *map* N-301
- Lulli** (*lū'lē*), Giovanni Battista, French, Jean Baptiste Lully (1632-87), celebrated composer, born Italy, called "father of French opera"; taken to Paris, France, as boy, worked as servant; rose to position of court musician to Louis XIV; introduced lively ballets; dominated French opera for almost a century: O-388
- Lully, Raymond** (Ramón Lull or Raymundus Lullius) (1235-1315), Catalan (Spain) scientist and missionary; authority on Arabic; founder of western orientalism forerunner of modern chemists C-221
- Lumbar nerves**, *picture* N-113

Lumbar vertebra, vertebra in the region of the loins S-191
 Lumber and timber L-340-50, W-186a-b, map L-350, pictures L-340-9. See also in *Index* Forests and forestry; Lumbering; Wood; also names of trees commercial varieties L-350 creosote treatment C-510 hardwood F-239b, W-186, pictures T-180-82, table W-186c: greatest center in United States M-171 heaviest in United States H-355 manufactured lumber W-186d pine most useful to man P-257-9 plywood P-327
 producing regions L-347, 350
 Canada C-78, 87; British Columbia B-314; New Brunswick N-138a, C-78, picture N-138; Ontario O-388; Quebec Q-7
 Finland F-70
 Germany G-93, B-203-4, H-280, picture G-90
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 Norway N-302, 304a, picture N-303
 Philippine Islands P-200
 Russia R-277
 Sweden S-462, picture S-461
 United States U-280-1, 298, 307-8, 318, maps L-350, U-318: Alabama A-114, 116; Arkansas A-360; California C-41, S-102; Delaware D-55; Florida F-152; Georgia G-70; Idaho I-14; Louisiana L-324, picture L-323; Maine M-46; Michigan M-216, 219-20, pictures M-217, 218; national, state, and community forests F-241, see also in *Index* Forests, table; New Hampshire N-144; North Carolina N-277; Oregon O-410, picture O-409; Pennsylvania P-123; Tennessee T-58, M-171; Texas T-78; Virginia V-480; Washington W-37, T-1, picture W-47; West Virginia W-111; Wisconsin W-166
 pulpwood timber, pictures P-67, 68b, G-41
 quarter-sawn flooring B-346a
 reforestation and reserves
 United States: Arkansas A-360; California S-102; Michigan M-216, 219; Pennsylvania P-123; Vermont V-460; Wisconsin W-166
 seasoning or drying L-347, W-186d softwood W-186, F-239b, table W-186b
 substitutes P-304, L-350
 United States, annual board feet cut, map L-350
 veneer V-440
 Lumbering L-340-50, map L-350, pictures L-340-9. See also in *Index* Lumber
 block logging F-239, picture F-239a
 conservation practices F-239, L-342-3, pictures C-452b, F-239a, 240
 felling trees L-344, pictures L-340, 341, O-409
 hauling logs L-344, pictures L-345, C-175: American Colonies, picture A-213
 logging camp to sawmill L-346, pictures L-343, 346, 347: Bolivia, picture B-222a; Sweden, picture S-461
 Paul Bunyan stories B-356, S-118, 423, F-197, L-341, pictures F-198, M-290
 sawmill L-346-7, pictures L-348-9
 selective logging F-239, L-342-3
 Tony Beaver stories F-197
 Lumberjack, a lumberman
 folklore F-197-200
 how he lives L-340-2, pictures L-342, 343
 Paul Bunyan stories B-356, F-197, L-341, S-118, 423, pictures F-198, M-290

work of L-344-6, pictures L-340, 341, 344, 345. See also in *Index* Lumbering.
 Lu'men, unit of light intensity L-229
 Lumière (lū-mē-yēr'), Auguste Marie Louis Nicolas (1862-1954), French chemist and industrialist, born Besançon, France; brother of Louis J. Lumière, whom he helped in development of the cinématographe and with whom he manufactured photographic plates and paper; research on vitamins.
 Lumière, Louis Jean (1864-1948), French chemist and industrialist; brother of Auguste M. L. N. Lumière; in 1895 invented cinématographe, the first motion-picture projector using intermittent movement of film; pioneer (1907) in natural-color photography and in three-dimensional movies (1935).
 Lu'minal, a sedative drug N-13
 Lumines'cence, or bioluminescence, the emission of light by living organisms P-208
 fish F-106-7, 100, P-208, O-330, picture F-107
 jack-o'-lantern mushroom M-457
 will-o'-the-wisp W-142
 Lumini'ferous ether R-98, L-232
 Lu'minous paint P-41, R-56
 Lummis, Charles Fletcher (1859-1928), explorer and writer, born Lynn, Mass.; spent latter half of life in Southwest and became an authority on history and archaeology of that region; learned language and customs of Indians and did much to improve their conditions ('The Land of Poco Tiempo'; 'The Man Who Married the Moon, and Other Pueblo Indian Folk Stories'; 'Mesa, Cañon and Pueblo').
 Lumpkin, Tony, character in Oliver Goldsmith's comedy 'She Stoops to Conquer', a coarse, ignorant country youth, fond of practical joking.
 Lumpsucker, a mail-cheeked fish of the spiny-finned group.
 Lu'na in Roman mythology, the goddess of the moon and of months words derived from name M-389
 Lunacharsky (lū-nā-chār'skē), Anatoly Vasiliyevich (1875-1933), Russian political leader and author; of wealthy parents, became revolutionary in 1892; as people's commissar for education in Soviet government prevented destruction of books, works of art after revolution; promoted instruction of people.
 Luna moth
 caterpillar and pupa, color picture B-367
 Lunar caustic. See in *Index* Silver nitrate
 Lunaria (lū-nā-rī-a), a genus of plants of mustard family, native of Eurasia, and one of common flowers of old-time gardens. Heart-shaped leaves; tiny, scented purple or white flowers; seed pod 2 in. long, transparent; used as everlasting. Also called moonwort, honesty, satin flower, and silver dollar.
 Lunar month, or synodic month M-380, M-387
 Lunar year Y-334, C-22
 Lun'dy, Benjamin (1789-1839), a philanthropist, prominent in anti-slavery movement, born Hardwick, N.J.; published antislavery magazine and lectured against slavery in many states
 influences Garrison G-27
 Lundy's Lane, battle of, in War of 1812, between British and American forces near Niagara Falls on Canadian side W-14
 Lüneburg (lū-nē-burg), district of Lower Saxony; contains Lüne-

burger Heide (Lüneburg Heath), about 55 mi. long; map G-88
 Lüneburg, Germany, city of Lower Saxony s.e. of Hamburg; pop. 58,139; was prominent in Hanseatic League; cement works, salt spring; map E-424
 Lunenburg, Nova Scotia, Canada, industrial and fishing town 40 mi. s.w. of Halifax; pop. 2816: N-307, 308, map C-73
 Lunéville (lū-nā-vēll'), town of n.e. France 18 mi. s.e. of Nancy; pop. 19,065; treaty between France and Austria (1801): map E-425
 Lunéville, Treaty of (1801). See in *Index* Treaties, table
 Lung, artificial, for submarine escape, picture S-138
 Lungfish. See in *Index* Mudfish
 Lungi, or lungee (lūng'gē), long cloth used as a loincloth, scarf, or turban P-42b
 Lungk'iang (lūng'gi-āng'), Japanese Tsitsihar (tsē'tsē-hūr), Manchuria, capital of Heilungkiang province on Nonni River; pop. 174,675; port and trade center, served by river and railroad: maps M-72, A-406
 Lungs, organs of respiration in air-breathing animals
 artificial, perfected by Alexis Carrel and Charles A. Lindbergh L-253
 human L-351, R-117-18, color pictures P-240-2, diagram L-351
 mudfish M-444
 Lungworms W-303
 Lungwort, Virginia cowslip, or bluebell, a perennial plant (*Mertensia virginica*) of the borage family with pale-green leaves and clusters of purplish-blue trumpet-shaped flowers; often cultivated in gardens; herbalists once used extract made from leaves to treat lung diseases: color pictures F-174, P-286
 Lunt, Alfred (born 1893), actor, born Milwaukee, Wis.; starred with wife, Lynn Fontanne, in Theatre Guild productions and in moving pictures ('Reunion in Vienna'; 'The Guardsman'). See also in *Index* Fontanne, Lynn
 in 'Elizabeth the Queen', picture D-135
 Lupercalia, Roman spring festival in honor of ancient god Lupercus, protector of flocks against wolves, sometimes identified with Faunus
 dance D-14d
 St. Valentine's Day, origin S-24
 Lutesen, Elena (Magda) (born 1904). Rumanian woman, former stenographer, whose influence over King Carol II played part in history of Rumania; fled with him into exile 1940, married him 1947.
 Lu'pines, various plants of the bean family, with white, yellow, or blue flowers on a central spike; contain poison: color picture F-172
 how to plant, table G-16
 Lu'pulin, an alkaloid, the active principle of hops H-424
 Lupus, constellation, chart S-377
 Luque (lū'kū), Hernando de, partner of Pizarro P-280
 Luray Cavern, large limestone cave in Page County, Va., celebrated for stalactites, picture C-157
 Lurcat (lūr-sā), André (born 1894), French modern architect; works both utilitarian and esthetic; vigorous style, balanced proportions.
 Lurcat, Jean (born 1892), French modernist painter and tapestry designer; influenced revival of French tapestry-weaving industry in 1920's and 1930's.
 Lure, in falconry F-16
 Lure, artificial, in fishing F-118c
 bait casting, pictures F-118c

- fly fishing F-118e, pictures F-118d spinning F-118f
- Lurs (*lɔrʒ*), nomadic people of Iran, probably of Aryan origin I-222
- Lusaka (*lɔ-sū'ka*), capital of Northern Rhodesia; pop. 19,825: R-144b, maps A-47, E-199
- Lushun, Manchuria. *See in Index* Port Arthur
- Luslads (*lū'si-āds*), The', Portuguese Os Lusladas ("the sons of Lusus," or "the Portuguese"), one of greatest epic poems of world literature, by Camoens P-380
- Lusitania (*lū-si-tān'ya*), ancient Roman province comprising most of modern Portugal and s.w. Spain.
- 'Lusitania', British ocean liner, torpedoed and sunk by Germans May 7, 1915 W-225, 234, W-146-7
- Lute, ancient pear-shaped stringed instrument of Arabian origin, picture M-467
- popularity M-460
- Lutes, Della Thompson (died 1942), writer, born Jackson, Mich.; 'Country Kitchen' and 'Home Grown' depict life on a Michigan farm in 70's.
- Lutetia (*lū-tē'shi-ā*), ancient name of Paris, France P-84
- Lutetium, a transitional chemical element, tables P-151, C-214
- Lutisk (*lūt'fisk*), Scandinavian dish C-294a
- Luther (*lɔt'ēr*, English *lū'thēr*), Hans (born 1879), German statesman; in 1924 concluded Dawes loan for Germany; chancellor 1925-26; instituted taxation and tariff reform; president of Reichsbank 1930; ambassador to U.S. 1933-37.
- Luther, Martin (1483-1546), leader of Protestant Reformation L-352-3, R-91-2, pictures L-352, G-82, R-91
- Charles V opposes C-190
- Christmas tree legend C-294
- Dürer D-164
- Henry VIII opposes H-338
- holidays for, in Germany F-59
- hymn composer M-460
- Influence on German language G-83
- Zwingli Z-366
- Lutheranism, religious movement that grew out of teachings of Martin Luther. For membership of Lutheran bodies, *see in Index* Religion, table
- America C-303
- Denmark D-70
- early spread of R-92, T-118
- Norway N-304a
- number of adherents R-101
- Sweden S-465
- Luther College, at Decorah, Iowa; Lutheran; founded 1861; arts and sciences.
- Luther League of America, an organization of several Lutheran Young People's Societies established 1895 at Pittsburgh, Pa.; originally non-synodical; adopted by United Lutheran church in America, 1920.
- Lutine Bell, in Lloyd's of London; came from the frigate 'La Lutine' which sank in 1790 with a cargo of gold; Lloyd's underwriters had insured the cargo and had suffered heavy loss: picture I-169
- Luton (*lū'ton*), England, town 30 mi. n.w. of London; pop. 110,370; chief seat of English straw-plait manufacturing: map B-325
- Luttrell Psalter, illuminated manuscript of 14th century, picture E-362
- Lutyens, Sir Edwin Landseer (1869-1944), British architect, born London, England; designer of public buildings and homes; planned New Delhi, India; works include Government House, New Delhi. Whitehall Cenotaph, London, and British Embassy, Washington, D.C.; Royal Academy 1920, Order of Merit 1943
- plan of Delhi D-62
- Lutz, Frank Eugene (1879-1943), biologist, born Bloomsburg, Pa.; with American Museum of Natural History, New York City, from 1909; curator of its Department of Insects and Spiders 1921-43 ('Field Book of Insects').
- Lutz, Grace Livingston Hill. *See in Index* Hill, Grace Livingston
- Lützen (*lüt'sén*), Germany, town in Saxony
- battle (1632) G-234
- Luxembourg (*lūk-sūh-bɔr'*), Palace of, Paris, France, map P-83a, picture P-83b
- Rubens decorates gallery R-246
- Luxemburg, Rosa (1870-1919), German socialist agitator, cripple, but a fiery orator; killed in Berlin riots.
- Luxemburg, also Luxembourg, grand duchy of n.w. Europe, surrounded by France, Germany, and Belgium; 999 sq. mi.; pop. 290,992; cap. Luxemburg: L-353-4, maps B-111, E-416, 425, picture L-353
- cemetery, U. S. National N-16b
- flag F-136b, color picture F-133
- invasion by Germany W-250
- relationships in continent, maps E-416-17, 419-20, 429
- Luxemburg, also Luxembourg, capital of grand duchy of Luxembourg; pop. 61,996: L-353-4, map B-111, picture L-353
- Lux'or, village in Upper Egypt on part of site of ancient Thebes, near Karnak; famous for splendid ruins: map E-271
- column, picture E-283
- Luzern, Switzerland. *See in Index* Lucerne
- Luzon (*lɔ-sōn'*), largest and most important of Philippine Islands; 40,814 sq. mi.; pop. 7,388,564; contains Manila, largest city, and Quezon City, capital of islands: P-193, maps A-407, P-16, P-195
- rice terraces, picture P-193
- World War II W-261, 272, 292
- L'vov (*lɔ-vɔf'*), or Lwow, Russia, formerly Lemberg, former Polish fortified city 185 mi. e. of Cracow; pop. 400,000; capital of Austrian Galicia in 18th century; returned to Poland after World War I; included in Russia since 1945: P-342, maps R-267, E-417
- Lyautey (*lī-ō-tē'*), Louis Hubert, (1854-1934), French marshal; as resident general and high commissioner of Morocco (1912-25) put the government on a sound basis: M-395
- Lycabettus (*lik-ā-bēt'ūs*), Mount (modern Mount St. George), hill n.e. of Athens 1112 feet high; modern section of city spreads to its base; reservoir on its side built by Hadrian and Antoninus Pius still in use: pictures A-447, G-190
- Lycée (*lī-sā'*), French school
- American college compared C-383
- Lyceum (*lī-sē'ūm*), Aristotle's school in ancient Athens A-340, A-5
- continued under Theophrastus G-212
- Lyceum, an organization for popular instruction C-205
- Lychnis, scarlet. *See in Index* Jerusalem cross
- Lychnis coronaria, scientific name of mullein pink, a tall biennial of pink family with oval or oblong leaves and clusters of showy rose-colored flowers.
- Lycia (*līk'i-ā*), ancient division of s.w. Asia Minor on Mediterranean, conquered by Persia 6th century B.C., then subject in turn to Macedonia, Egypt, Syria, Rome, map P-156
- 'Lycidas' (*līs'i-dās*), poem by John Milton commemorating death of his friend Edward King, drowned at sea.
- Lycorning College, at Williamsport, Pa.; Methodist; founded as Williamsport Academy 1812, as college 1947; arts and sciences.
- Lycoperdon bovista, a mushroom, one of the puffballs, picture P-297, color picture M-456
- Lycopodium, a genus of nonflowering mosslike plants of the club moss family (*Lycopodiaceae*) with trailing stems and numerous small evergreen leaves; the sulfur-yellow, highly inflammable powderlike spores produced by erect fruiting spikes are sometimes used in making fireworks.
- Lycoris (*lī-kō'ris*), a genus of perennial plants of the amaryllis family, native to eastern Asia. Root a bulb; leaves long, narrow, disappearing before flowers develop; flowers yellow, red, or rose-lilac, fragrant, grow in cluster at top of tall stem, stamens project beyond flower tube; one species called golden spider lily.
- Lyeurgus (*lī-kū'r'gūs*) (late 9th or early 8th century B.C.), lawgiver of ancient Sparta L-354
- Lyd'ia, Hebrew Lod, Israel, ancient city situated about 10 mi. s.e. of Jaffa; pop. 10,450: maps B-138, I-256
- legend of St. George G-66
- Lyd'ite, an explosive derived from picric acid.
- Lydgate, John (1370?-1451?), English poet, scholar, and monk, born at Lydgate near Newmarket; contemporary of Geoffrey Chaucer and acknowledged him as his "master"; voluminous writer; style rough, verbose, and lacking in prosodic harmony; founder of English literary school between Chaucer and Edmund Spenser ('Troy Book'; 'Fall of Princes')
- 'Canterbury Tale', picture C-202
- Lydia, ancient kingdom in Asia Minor; early seat of Asiatic civilization with important influence on Greeks; later part of Roman province of Asia: maps G-197
- Croesus rules C-515
- Lydian stone. *See in Index* Touchstone
- Lye (*lī*), a caustic, particularly potassium or sodium hydroxide. *See also in Index* Caustic potash
- antidote F-96
- fruit preservative F-224
- paint removers P-42
- soaps S-211, 213
- Lyell, Sir Charles (1797-1875), British geologist; his studies and evidence established James Hutton's "uniformitarian" theory of earth's evolution as foundation of modern geology; proof of inorganic evolution led, in hands of Charles Darwin and others, to idea of organic evolution
- named geologic epochs G-56-7
- Lyle, David Alexander (1845-1937), U.S. Army officer, born Lancaster, Ohio; attained rank of colonel 1907; inventor of Lyle lifesaving gun.
- Lyle gun, a lifesaving cannon L-225, pictures L-226
- Lyly (*lī'lī*), or Lilly, John (1554?-1606), English romancer and dramatist who introduced into English literature the fantastic style of writing called euphuism ('Euphues', prose romance).
- Lyman, Edna. *See in Index* Scott, Edna Lyman
- Lyne (*līm*) grass, or wild rye, a coarse perennial grass of erect

growth found in temperate climates; used as ornamental plant.

Lyme Regis (*līm rē'gis*), seaport town of Dorsetshire, England, 135 mi. s.w. of London; fine beach; popular summer resort; settlement dates from 8th century; pop. 3191: *map* B-325

Lymph, a colorless liquid exuded through the capillaries to nourish tissues of the body: B-209, P-244

Lymphatic glands, small glands scattered throughout lymphatic system, but especially in the neck, armpits, groin, thighs, and body organs; produce corpuscular elements of lymph, including white corpuscles.

Lymphatic system, a system of vessels for collecting lymph and carrying it back into the blood: B-209, P-244-5

lacteals P-244

Lymphocytes, in blood B-208, 209

Lynbrook, N.Y., resort city on shore of Long Island, near New York City; pop. 17,314; chiefly residential: *map, inset* N-204

Lynch, Charles (1736-96), American political leader and soldier lynching probably named for L-354

Lynch, Thomas (1749-79), signer of Declaration of Independence, born South Carolina signature reproduced D-37

Lynchburg, Va., industrial city on James River near Blue Ridge Mountains, about 95 mi. s.w. of Richmond; pop. 47,727; tobacco market; shoes, textiles, metal products, paper; Randolph-Macon Woman's College, Lynchburg College; supply depot for Confederates during Civil War: V-480, *maps* V-486, U-253

Lynchburg College, at Lynchburg, Va.; Christian church institution; chartered 1903; opened 1903; arts and sciences.

Lynching L-354-5

Lynd, Robert Staughton (born 1892), sociologist, born New Albany, Ind.; professor of sociology Columbia University since 1931; with wife, Helen Merrell Lynd (born 1897), wrote 'Middletown' and 'Middletown in Transition', comprehensive sociological studies of a Middle Western city (Muncie, Ind.); 'Knowledge for What?' a study of social science in American culture.

Lyngen (*lūng'ēn*) Fjord, in n. Norway, near Tromsø; has high flanking cliffs.

Lynte (*lī'nīt*), an alloy, *table* A-174

Lynn (*līn*), Mass., a city near Boston; pop. 99,738: L-355, *map, inset* M-132

early shoe factory S-163

Lynnhaven Bay, on coast of Virginia w. of Norfolk oysters V-480, O-437

Lynwood, Calif., city 10 mi. s.w. of Los Angeles and about 11 mi. from ocean; pop. 25,823; incorporated 1921; oil-field area: thermostats, oil-well tools; *map, inset* C-35

Lynx (*līnks*), a large catlike animal with short tail and tufted ears L-355, *picture* L-355

purring C-135b

Ly'ou, Mary (1797-1849), pioneer in higher education for women, born near Buckland, Mass.; with some assistance in 1837 opened Mt. Holyoke Female Seminary (later Mt. Holyoke College) for higher education of middle-class girls

Hall of Fame, *table* H-249

Lyon, Nathaniel (1818-61), soldier, prominent opponent of states' rights and slavery, born Ashford, Conn.; organized Unionist troops in Missouri; killed Aug. 10, 1861, while leading charge against Confederates in battle of Wilson's Creek

saves Missouri for the Union M-324

Lyonnesse (*lī-ō-nēs'*), fabled land in Arthurian legends, off s. coast of Cornwall, England; said to have been engulfed by the sea.

Lyonnais (*lī-ō-nā*), historic French province, *map* F-270

Lyons (*lī'ōnz*), French Lyon (*lī-ōn'*), France, city at junction of Rhone and Saône rivers; pop. 439,861; L-356, *maps* F-259, E-416, 425

textile industry L-356

Ly'ra, or Lyre, constellation across North Pole from Little Bear; represents lyre of Orpheus or of Mercury: *charts* S-377-8, 381

Lyre (*līr*), harplike instrument

Babylonian, *picture* B-6b

legendary invention H-348

Orpheus and O-425-6

Lyrebird L-356, P-75, color *picture* P-74

'Lyrical Ballads' (1798), volume of poems by Wordsworth and Coleridge W-198

children's literature, place in L-272

Lyric opera, a form of light opera O-398

Lyric poetry P-337, L-98b

Greek G-210

Muse of M-454

Lyrids, a meteor group M-182

Lysander (*lī-sān'dēr*) (died 395 B.C.), able unscrupulous Spartan admiral; defeated Athens at Aegospotami

and terminated Peloponnesian War, becoming most powerful man in Greece; killed at outbreak of Boeotian War before he could make himself supreme.

Lys'sas (*līs'i-ās*) (459-380 B.C.), one of great Attic orators; originator of eloquent but plain style in Greek rhetoric.

Lysippus (*lī-sīp'ūs*) (4th century B.C.), Greek sculptor G-206

Hercules H-343

Ly'soi, a disinfectant C-371

Lys (*lēs*) River, a tributary of the Scheldt; rises in extreme n. of France and flows n.e. 120 mi. past Armentières and Courtrai, joining Scheldt at Ghent; scene of terrific fighting in World War I; axis of 2d German offensive (April 9-26) in 1918: *map* B-111

World War I W-228, *map* W-217

Lyte, Henry Francis (1793-1847), British divine and hymn writer; author of 'Poems, Chiefly Religious', 'The Spirit of the Psalms' and the popular hymns 'Abide with Me', 'Jesus I My Cross Have Taken'.

Lythraene. See in *Index* Loosestrife family

Lythrum (*līth'rūm*), or purple loosestrife, a perennial plant (*L. salicaria*) of the loosestrife family, found from New England to Utah. Grows to 3 ft.; leaves narrow, 4 in. long; flowers purple, in dense spikes, with each floret borne in axil of a tiny leaf; also called spiked loosestrife.

Lyttelton, Oliver (born 1893), British industrialist; minister of state 1941, minister of state supervising war production in Britain's war Cabinet 1942; president of board of trade May-July 1945; colonial secretary Oct. 1951-July 1954.

Lyt'ton, Edward George Earle Bulwer-Lytton, first Baron (1803-73), English novelist, playwright, and political leader; member of Parliament 1831-41, 1852-66; made secretary for the colonies 1858; historical novels vivid and interesting but inclined toward sensationalism ('Last Days of Pompeii'; 'Harold, the Last of the Saxon Kings'); also wrote successful plays ('Lady of Lyons'; 'Richelieu'; 'Money').

Lytton, Edward Robert Bulwer-Lytton, first earl of (1831-91), pen name Owen Meredith, English statesman and poet, son of Baron Lytton; viceroy of India 1876-80 ('Lucile', sentimental novel in verse).